IGW/800 Device Server
Linux Starter Kit

User Manual

SSV Embedded Systems
Heisterbergallee 72
D-30453 Hannover
Phone +49-(0)511-40000-0
Fax +49-(0)511-40000-40
e-mail: sales@ist1.de

Manual Revision: 1.3
Date: 2005-05-20

For further information regarding our products please visit us at www.ssv-comm.com

CONTENT

1 INTRODUCTION 4
1.1 Conventions used in this Document 4
1.2 Checklist 4
1.3 Features IGW/800 5
2 IGW/800 OVERVIEW 6
3 IGW/800 COMPONENTS 7
3.1 Power LED 7
3.2 General Purpose LEDs 7
3.3 Ethernet Interface 7
3.4 Screw Terminals 7
3.5 DIN-Rail Mounting 7
4 CONNECTIONS 8
4.1 Mounting the IGW/800 on a DIN-Rail 8
4.2 Providing the IGW/800 with Power 9
4.3 Ethernet Link 10
4.4 RS232 Serial Link 10
4.5 RS485 Serial Link 10
4.6 Termination Resistor for the RS485 interface 10
4.7 RCM (Remote Console Mode) 10
5 USING A WINDOWS-BASED HOST 10
5.1 Setup the Serial Link 10
5.2 Checking the Ethernet Link 10
5.3 Web Server Access 10
5.4 Assigning a new IP-Address to the IGW/800 10
5.5 Running Linux 10
5.6 Filetransfer via TFTP 10
6 USING A LINUX-BASED HOST 10
6.1 Setup the Serial Link 10
6.2 Checking the Ethernet Link 10
6.3 Web Server Access 10
6.4 Assigning a new IP-Address to the IGW/800 10
6.5 Running Linux 10
6.6 Filetransfer via TFTP 10
6.7 GNU Cross Tool Chain 10
6.8 GNU Cross Debugger 10
6.9 GNU Cross Debugger with DDD (Data Display Debugger) 10

APPENDIX 1: BLOCK DIAGRAM 10
APPENDIX 2: MECHANICAL DIMENSIONS 10
APPENDIX 3: PINOUT IGW/800 10
APPENDIX 4: GNU GENERAL PUBLIC LICENSE 10
APPENDIX 5: GNU LESSER GENERAL PUBLIC LICENSE 10
LIST OF FIGURES 10
LIST OF TABLES 10
LIST OF APPENDIXES 10
HELPFUL LITERATURE 10
CONTACT 10
DOCUMENT HISTORY 10

1 INTRODUCTION

The focus of the IGW/800 is on safe communication via Ethernet technology in an industrial environment. The IGW/800 offers therefore a 10/100Mbps LAN-port which is ready to integrate the IGW/800 into various industrial solutions. Of course the purpose of this Device Server is not limited only to communicate via Ethernet. With the additional serial interface there are plenty of ideas to realize.

This document describes how to start with the IGW/800. For further information about the individual components of this product you may follow the links from our website at *http://www.ssv-comm.de.*

Our Website contains a lot of technical information, which will be updated in regular periods.

1.1 Conventions used in this Document

Convention	Usage
italic	Filenames, Internet addresses like e.g. *www.ssv-embedded.de*
bold italic	User inputs, command lines and pathnames
bold	Important terms
`monospace`	Program code
UPPERCASE	Keyboard button like e.g. ENTER

Table 1-1: Convention usage

1.2 Checklist

Compare the content of your IGW/800 package with the standard checklist below. If any item is missing or appears to be damaged, please contact SSV Embedded Systems.

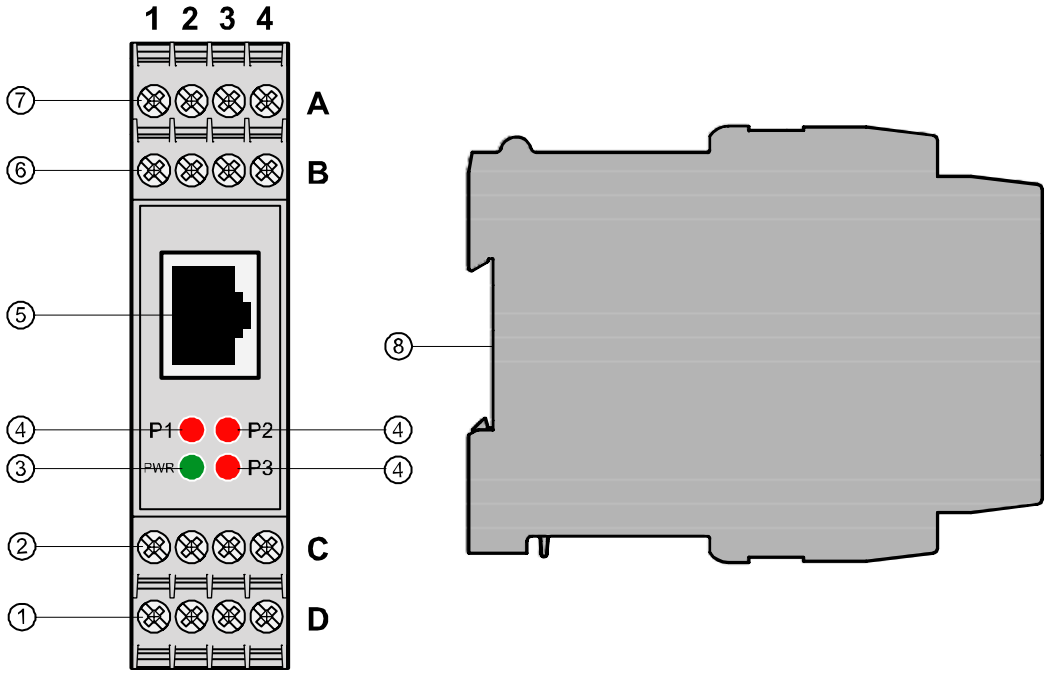
Standard items of the Starter Kit

- ✓ IGW/800 Linux Device Server
- ✓ Power supply
- ✓ Power adapter cable
- ✓ Null-modem cable
- ✓ RS232 adapter cable
- ✓ RCM cable bridge
- ✓ Support CD-ROM
- ✓ Screwdriver

1.3 Features IGW/800

- One 10/100Mbps Ethernet interface
- One RS232 serial interface via screw terminals
- One RS485 serial interface via screw terminals
- Power LED
- Three general purpose LEDs
- DIN-rail mounting
- DNP/5282 with 32-bit Motorola Coldfire 66 MHz
- 16 MB SDRAM
- 8 MB Flash
- Full programmable
- Pre-installed embedded Linux
- 12 – 24V DC supply voltage

2 IGW/800 OVERVIEW



① Screw terminal D1 - D4
② Screw terminal C1 - C4
③ Power LED
④ Port LEDs P1, P2, P3
⑤ Ethernet interface
⑥ Screw terminal B1 - B4
⑦ Screw terminal A1 - A4
⑧ DIN-rail mounting

Figure 2-1: IGW/800 overview

3 IGW/800 COMPONENTS

This chapter describes the components of the IGW/800 shown in **chapter 2** and gives a short overview about their respective functions.

3.1 Power LED

This green LED lights up when the board is provided with the necessary operating voltage of 12 – 24 V DC.

3.2 General Purpose LEDs

The three red LEDs are for general purpose. Table 3-1 shows the assignment of the LEDs.

LED	Signal
PWR	fix 3.3 V DC
P1	PIO Port PA4
P2	PIO Port PA5
P3	PIO Port PA3

Table 3-1: Assignment of the general purpose LEDs

Note: Each Port LED is on when there is a high level signal on the respective PIO Port available.

Signal low (0) – LED off
Signal high (1) – LED on

3.3 Ethernet Interface

The IGW/800 offers Ethernet connectivity with a speed up to 100Mbps. The RJ45 Ethernet interface of the IGW/800 automatically detects the connection speed and switches to 10Mbps or to 100Mbps mode.

3.4 Screw Terminals

With the adapter cables you can connect the power supply and different devices to the screw terminals on the IGW/800.

Please see **chapter 4.2** how to connect the power supply.

Please see **chapter 4.3** how to create a RS232 serial link.

Please see **chapter 4.4** how to create a RS485 serial link.

3.5 DIN-Rail Mounting

The DIN-rail mounting allows a quick and easy connection of the IGW/800 on a DIN-rail. Please see **chapter 4.1** for a detailed mounting instruction.

4 CONNECTIONS

For a quick and easy start with the IGW/800 there are several connections necessary. The following chapter describes, how and between which components these connections have to be made.

4.1 Mounting the IGW/800 on a DIN-Rail

To mount the IGW/800 on a DIN-rail is very simple. To click the IGW/800 on the DIN-rail, just hinge the device into the upper edge of the DIN rail. Then press it downwards to compress the spring inside the DIN-rail mounting unit (1). After this, push the IGW/800 against the DIN-rail as to snap it on.

The figure 4-1 shows these steps.

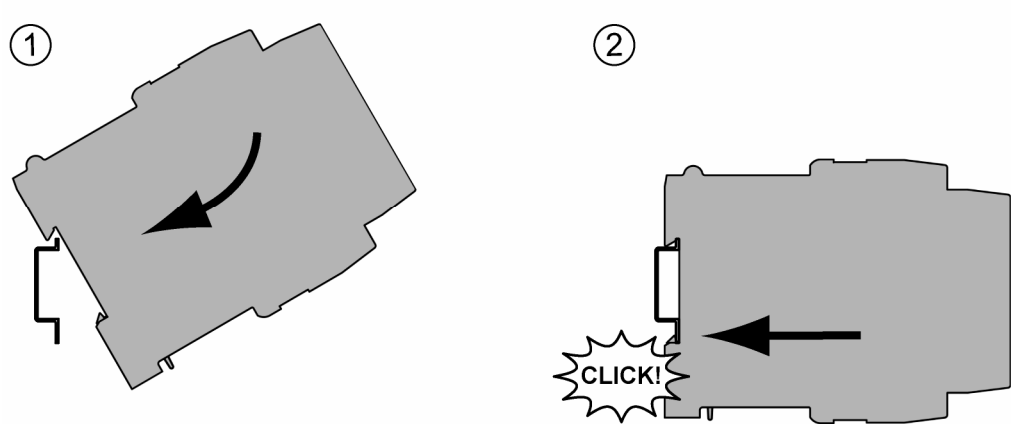
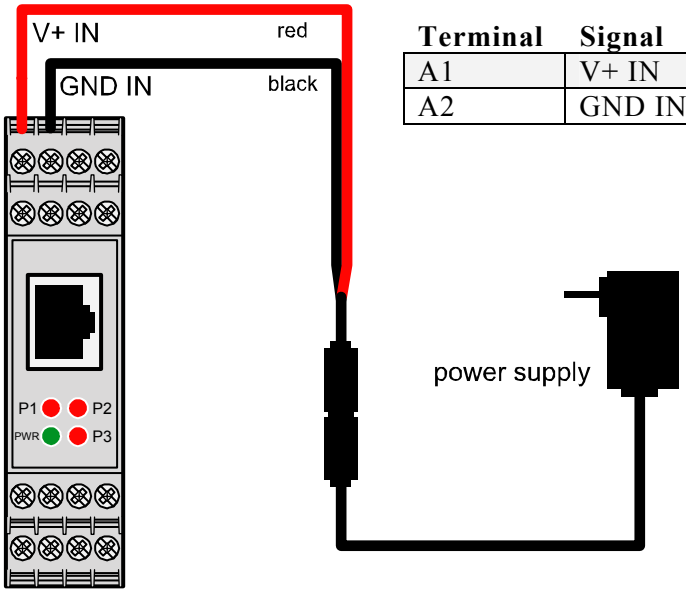


Figure 4-1: Mounting the IGW/800 on a DIN-rail

To snap the IGW/800 off, pull the plastic disassembling lever on the bottom of the IGW/800 downwards with the aid of a screwdriver and remove the device from the DIN-rail.

4.2 Providing the IGW/800 with Power

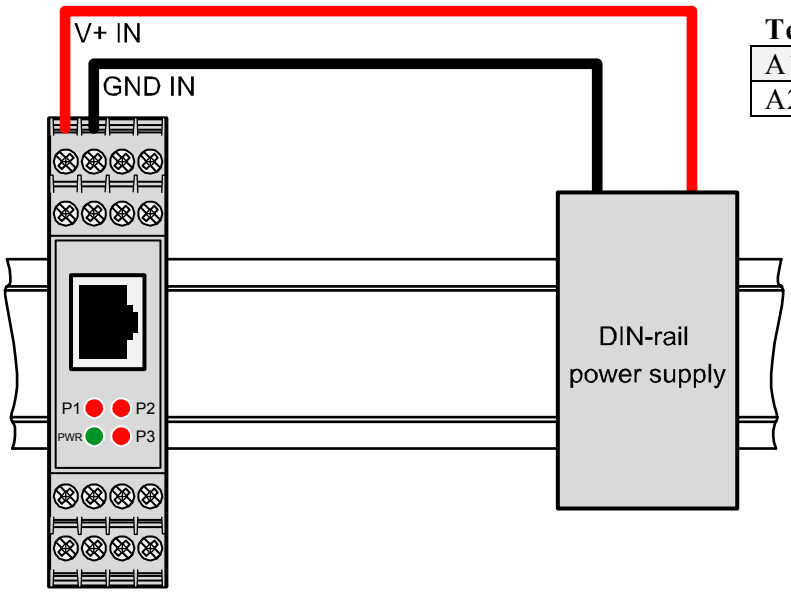
The IGW/800 needs a supply voltage of 12 – 24 V DC to work. In your IGW/800 Starter Kit you will find a plug-in power supply unit and a power adapter cable to provide the system with the necessary power in a software development environment.



Terminal	Signal
A1	V+ IN
A2	GND IN

Figure 4-2: Connecting the IGW/800 with the power supply for software development

The next figure shows how to provide the IGW/800 with power in an industrial environment on a DIN-rail.



Terminal	Signal
A1	V+ IN
A2	GND IN

Figure 4-3: Providing the IGW/800 with power in an industrial environment on a DIN-rail

Note: To provide the IGW/800 on a DIN-rail with power, you need a special DIN-rail power supply, which is not part of the IGW/800 Starter Kit.

4.3 Ethernet Link

The Ethernet link can be made on two ways. First with a crossover cable and second with two standard 10/100Mbps patch cables and a hub or switch. In both cases an Ethernet-LAN interface for your host is required. If you use a hub or switch please connect them between your host and the IGW/800 like shown in the figure below.

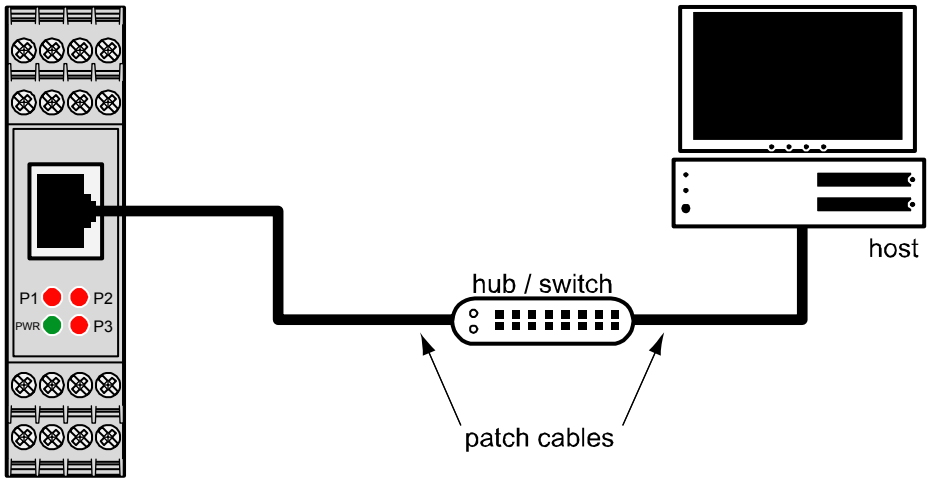


Figure 4-4: Ethernet link with hub/switch

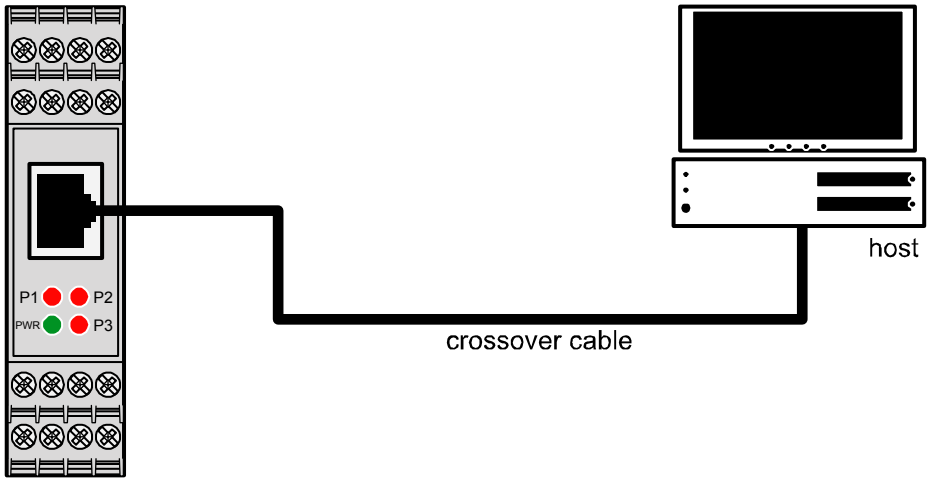


Figure 4-5: Ethernet link with crossover cable

4.4 RS232 Serial Link

For a basic communication with the IGW/800 use the RS232 adapter cable and the null modemcable wich come along with your IGW/800 Starter Kit. Connect the port COM1 of the IGW/800 with the COM port of your host by using these cables.

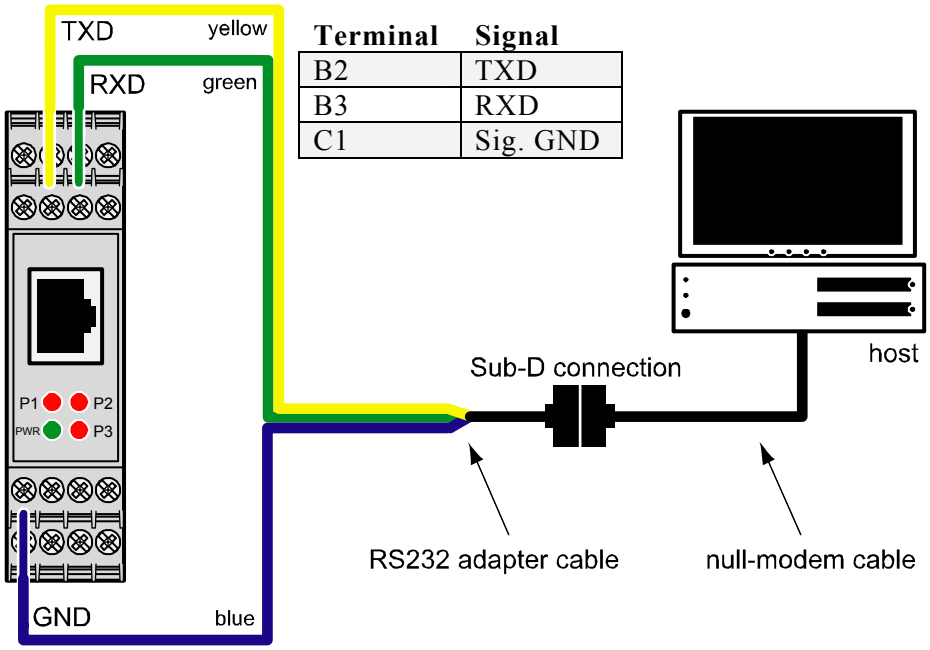


Figure 4-6: RS232 serial link

4.5 RS485 Serial Link

The RS485 mode allows you to integrate corresponding 2-wire bus systems into a TCP/IP network with the help of the IGW/800. For RS485 communication between the IGW/800 and a RS485 device (e.g. a data acquisition module) use a RS485 adapter cable. This cable is not included in your IGW/800 Starter Kit.

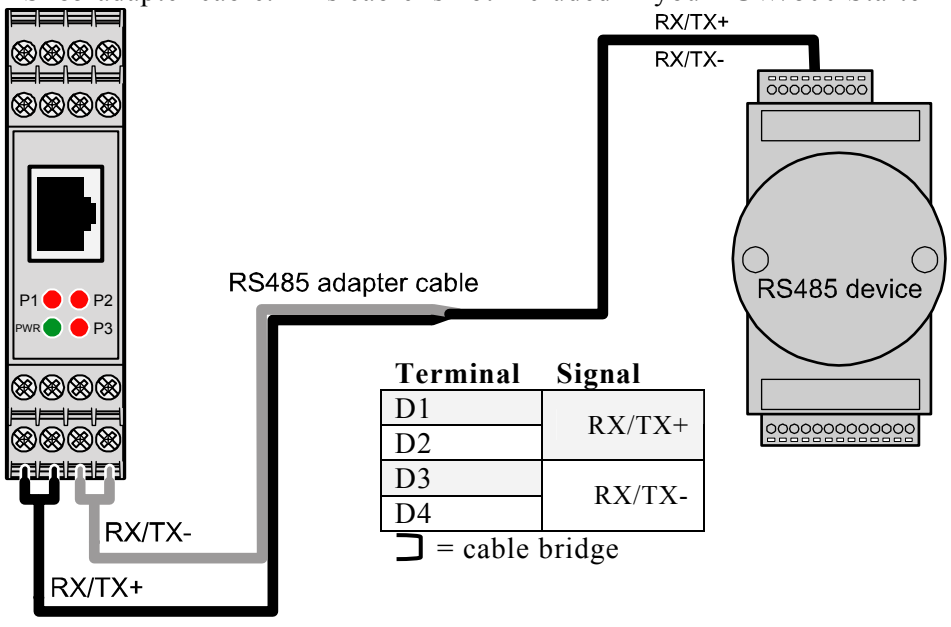
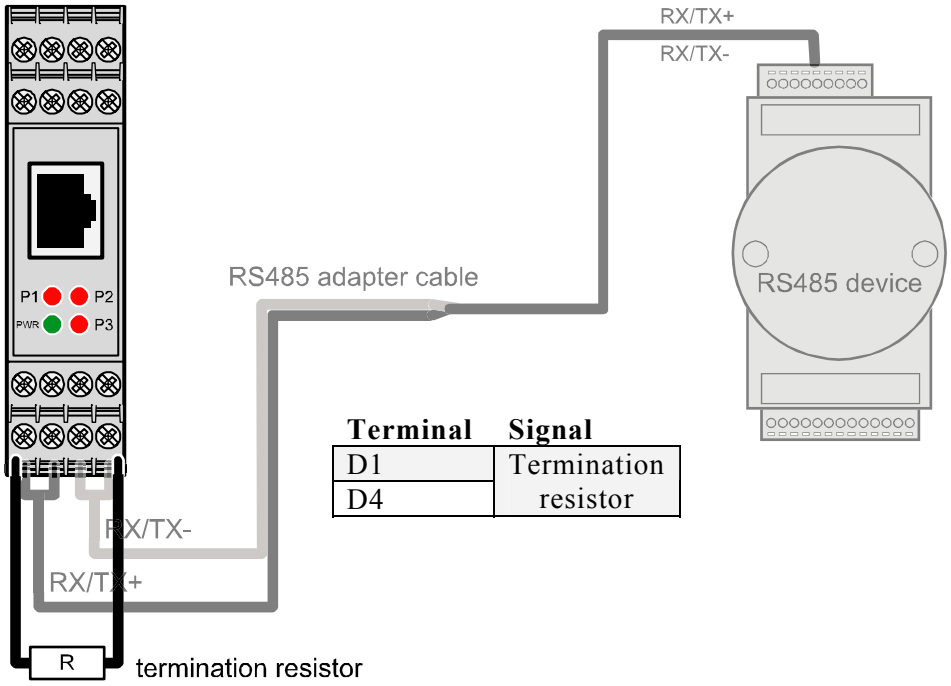


Figure 4-9: RS485Figure 4-7: RS485 serial link

4.6 Termination Resistor for the RS485 interface

By using the RS485 interface of the IGW/800 the bus line must be terminated at the two most distant bus ends. To terminate the RS485 bus line, a termination resistor has to be connected with the IGW/800. The next figures show how to connect a termination resistor to the IGW/800.



Terminal	Signal
D1	Termination resistor
D4	

Figure 4-8: Connection of the termination resistor for a RS485 serial link

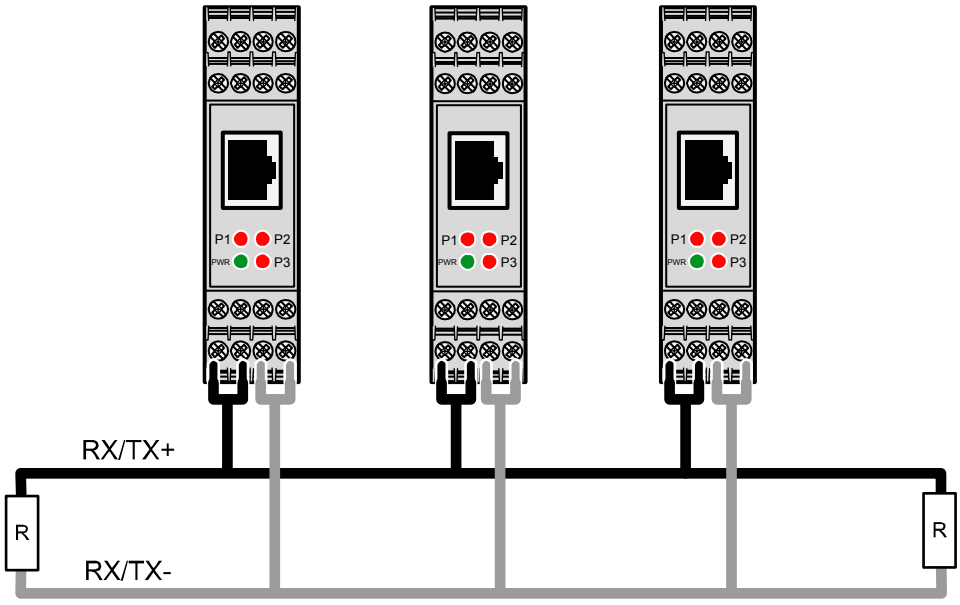


Figure 4-9: Connection of the termination resistor for a RS485 serial link

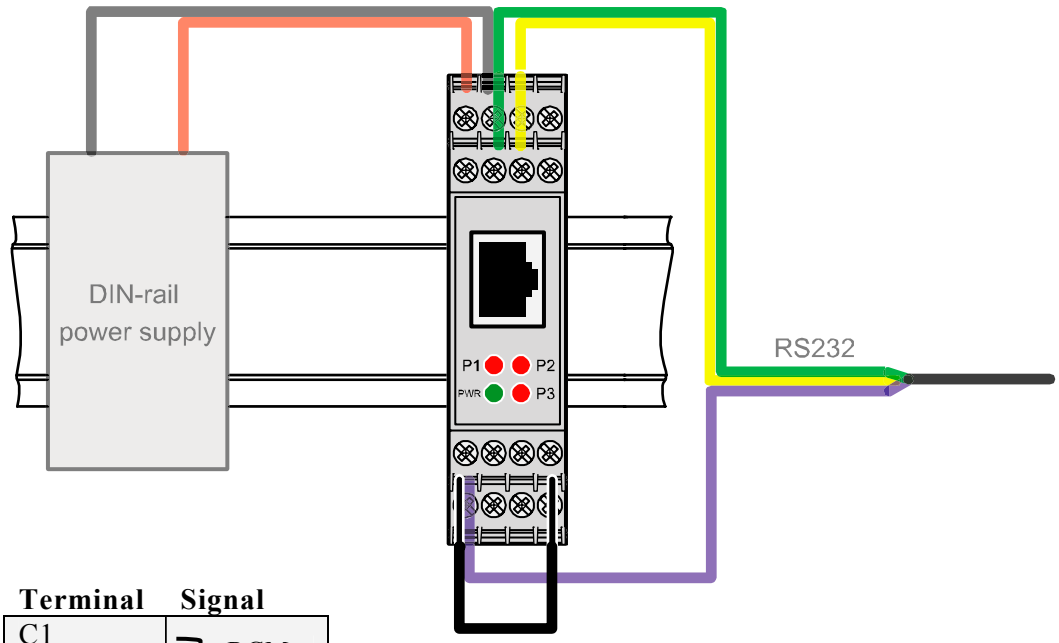
4.7 RCM (Remote Console Mode)

The **Remote Console Mode** realizes some basic operating modes such as a boot loader or a ROM-monitor program (Motorola-dBUG) which can be used for different service purposes like setting the IP-address.

The default setting of RCM is enabled. If RCM is disabled, the IGW/800 will boot with µCLinux and you can only communicate via Telnet.

Only with RCM enabled you can use a serial console like HyperTerminal for MS Windows or Minicom for Linux to interact with the IGW/800.

To enable RCM on the IGW/800 just connect the screw terminals C1 and C4 with a cable bridge like shown below.



Terminal	Signal
C1	⊐ RCM
C4	

⊐ = cable bridge

Figure 4-10: Activation of RCM on the IGW/800

5 USING A WINDOWS-BASED HOST

The “heart” of the IGW/800 is the programmable DIL/NetPC DNP/5282. The following paragraphs will help you to use the DNP/5282 with a host running under MS-Windows. For these steps you need a terminal program like **HyperTerminal**, which normally comes along with every MS-Windows installation. Please make sure that this program is present on your host. If this program is not installed on your host, you have to install this program manually from your MS-Windows installation CD-ROM.

Note: In some following screenshots you will find the term “DNP/5280”, but that does not matter. The µCLinux for the DNP/5280 and for the DNP/5282 is the same!

5.1 Setup the Serial Link

Before you provide the IGW/800 with power for the first time, please run a terminal program that offers communication capabilities on your host. In the following you will see the necessary settings for HyperTerminal under MS Windows. Select the "direct link cable connection via COM1" interface (or any other appropriate COM-port of the host) in the dialog box and choose "OK".

Figure 5-1: Interface dialog box

Now you can change some configuration parameters – such as the maximum baud rate – on a further dialog box. Select the value "115.200" in the "bits per second" field and close the dialog box by clicking the "OK" button, as shown in the next figure.

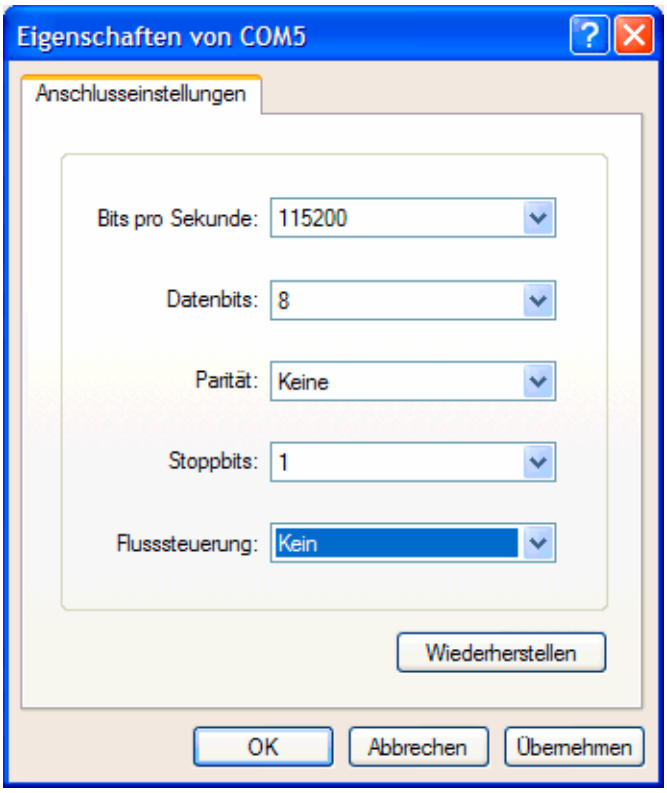


Figure 5-2: Communication parameter settings

All these settings can also be used for other terminal programs. The following parameters are important to use:

- Connection speed 115.200 bps (bits per second)
- 8 data bits
- No parity bit
- 1 stop bit
- No protocol (Xon/Xoff, RTS/CTS or similar).

Now turn on the power for the IGW/800 and you will see all steps of the DNP/5282 boot process in the terminal program window at your PC. If you do not see the following boot process, please make sure that RCM is not enabled (please see **chapter 3.5** for detailed information).

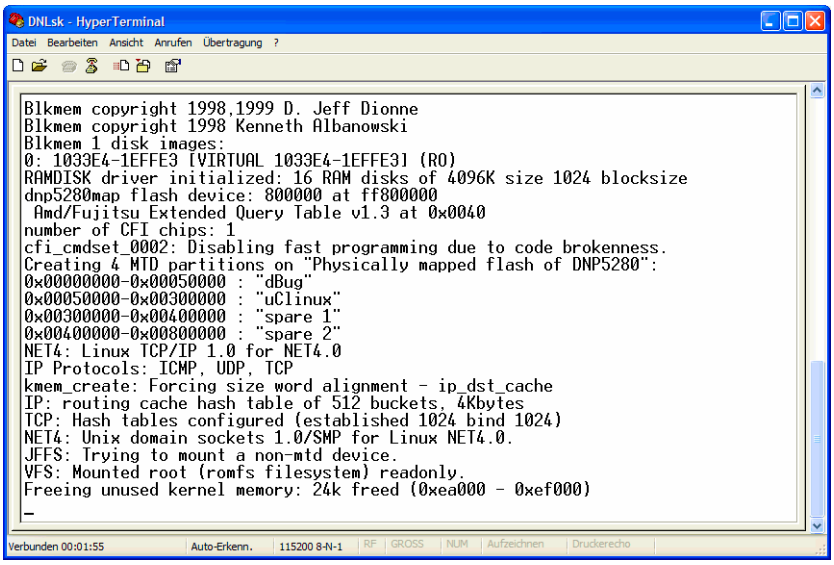

DNLsk - HyperTerminal
Datei Bearbeiten Ansicht Anrufen Übertragung ?
Blkmem copyright 1998,1999 D. Jeff Dionne
Blkmem copyright 1998 Kenneth Albanowski
Blkmem 1 disk images:
0: 1033E4-1EFFE3 [VIRTUAL 1033E4-1EFFE3] (RO)
RAMDISK driver initialized: 16 RAM disks of 4096K size 1024 blocksize
dnp5280map flash device: 800000 at ff800000
Amd/Fujitsu Extended Query Table v1.3 at 0x0040
number of CFI chips: 1
cfi_cmdset_0002: Disabling fast programming due to code brokenness.
Creating 4 MTD partitions on "Physically mapped flash of DNP5280":
0x00000000-0x00050000 : "dBug"
0x00050000-0x00300000 : "uClinux"
0x00300000-0x00400000 : "spare 1"
0x00400000-0x00800000 : "spare 2"
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
kmem_create: Forcing size word alignment - ip_dst_cache
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 1024 bind 1024)
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
JFFS: Trying to mount a non-mtd device.
VFS: Mounted root (romfs filesystem) readonly.
Freeing unused kernel memory: 24k freed (0xea000 - 0xef000)
Verbunden 00:01:55 Auto-Erkenn. 115200 8-N-1 RF GROSS NUM Aufzeichnen Druckerecho

Figure 5-3: Linux boot process

After the self test sequence is done the Linux boot process will be initialized. When finished, you will see the following screen with a Linux prompt which is waiting for a user input.

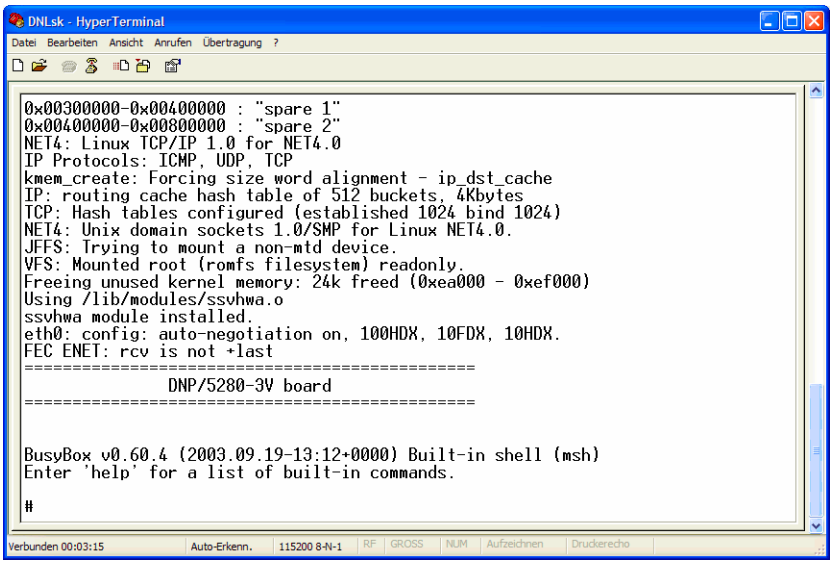

DNLsk - HyperTerminal
Datei Bearbeiten Ansicht Anrufen Übertragung ?
0x00300000-0x00400000 : "spare 1"
0x00400000-0x00800000 : "spare 2"
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
kmem_create: Forcing size word alignment - ip_dst_cache
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 1024 bind 1024)
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
JFFS: Trying to mount a non-mtd device.
VFS: Mounted root (romfs filesystem) readonly.
Freeing unused kernel memory: 24k freed (0xea000 - 0xef000)
Using /lib/modules/ssvhwa.o
ssvhwa module installed.
eth0: config: auto-negotiation on, 100HDX, 10FDX, 10HDX.
FEC ENET: rcv is not +last
DNP/5280-3V board
BusyBox v0.60.4 (2003.09.19-13:12+0000) Built-in shell (msh)
Enter 'help' for a list of built-in commands.
#
Verbunden 00:03:15 Auto-Erkenn. 115200 8-N-1 RF GROSS NUM Aufzeichnen Druckerecho

Figure 5-4: Linux command prompt

Now please enter ***ifconfig*** to see the network interface addresses of the DNP/5282 inside of the IGW/800.

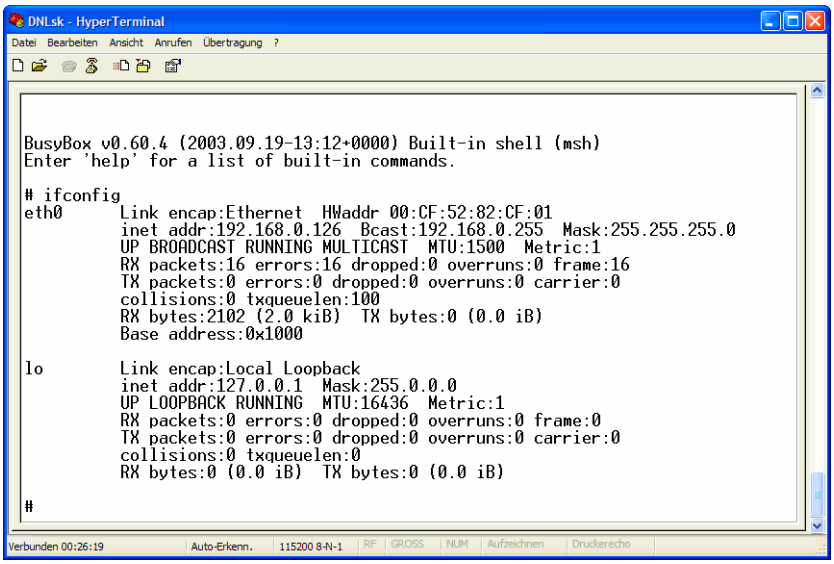

DNLsk - HyperTerminal
Datei Bearbeiten Ansicht Anrufen Übertragung ?
BusyBox v0.60.4 (2003.09.19-13:12+0000) Built-in shell (msh)
Enter 'help' for a list of built-in commands.
ifconfig
eth0 Link encap:Ethernet HWaddr 00:CF:52:82:CF:01
inet addr:192.168.0.126 Bcast:192.168.0.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:16 errors:16 dropped:0 overruns:0 frame:16
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:100
RX bytes:2102 (2.0 kiB) TX bytes:0 (0.0 iB)
Base address:0x1000
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
UP LOOPBACK RUNNING MTU:16436 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 iB) TX bytes:0 (0.0 iB)
#
Verbunden 00:26:19
Auto-Erkenn.
115200 8-N-1

Figure 5-5: Network interface addresses

Note: For a first test of the Ethernet connection between the host and the DNP/5282 inside of the IGW/800 you have to change the assigned IP-address of your host to **192.168.0.254**.

To change the IP-address under MS-Windows just click "Start➲Settings➲Control Panel➲Network➲TCP/IP" and enter the new IP-address. Please make sure, that you do not use another IP-address – this will lead to different network problems.

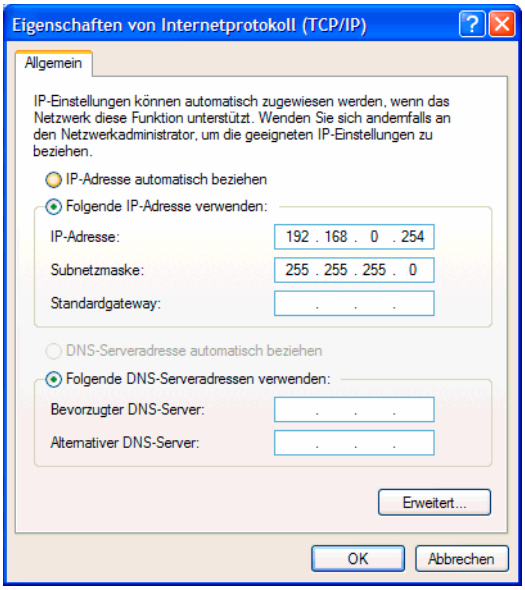

Eigenschaften von Internetprotokoll (TCP/IP)
Allgemein
IP-Einstellungen können automatisch zugewiesen werden, wenn das Netzwerk diese Funktion unterstützt. Wenden Sie sich andernfalls an den Netzwerkadministrator, um die geeigneten IP-Einstellungen zu beziehen.
IP-Adresse automatisch beziehen
Folgende IP-Adresse verwenden:
IP-Adresse: 192 . 168 . 0 . 254
Subnetzmaske: 255 . 255 . 255 . 0
Standardgateway:
DNS-Serveradresse automatisch beziehen
Folgende DNS-Serveradressen verwenden:
Bevorzugter DNS-Server:
Alternativer DNS-Server:
Erweitert...
OK
Abbrechen

Figure 5-6: Windows IP address settings

5.2 Checking the Ethernet Link

To test the TCP/IP-communication we use PING a very popular TCP/IP-utility program. Please open a DOS window (you can find it in the Windows Start menu) and enter:

ping 192.168.0.126

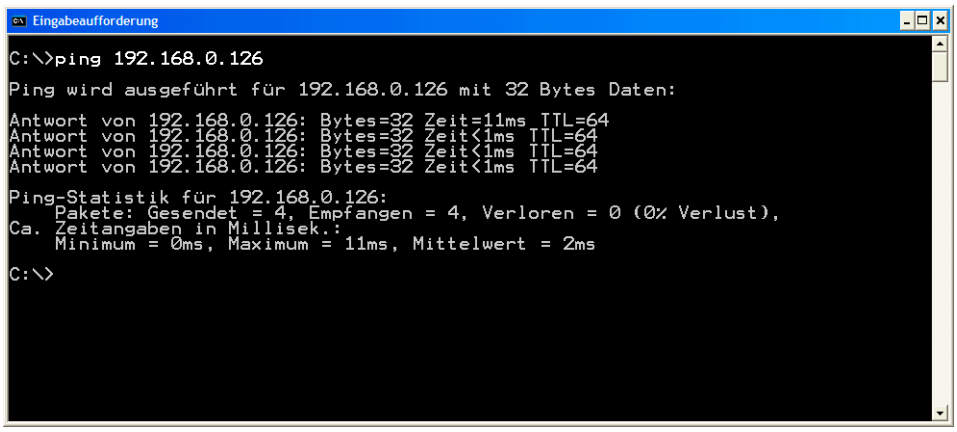


Figure 5-7: Communication check via PING

The IGW/800 must answer this ping. Otherwise an error will occur. In this case you have to check all parts of your LAN-connection, including the IP-address of the host. The correct value of the IP-address is "192.168.0.254". For an easy check of the IP-address within the DOS window, you can use the following DOS-command:

ipconfig

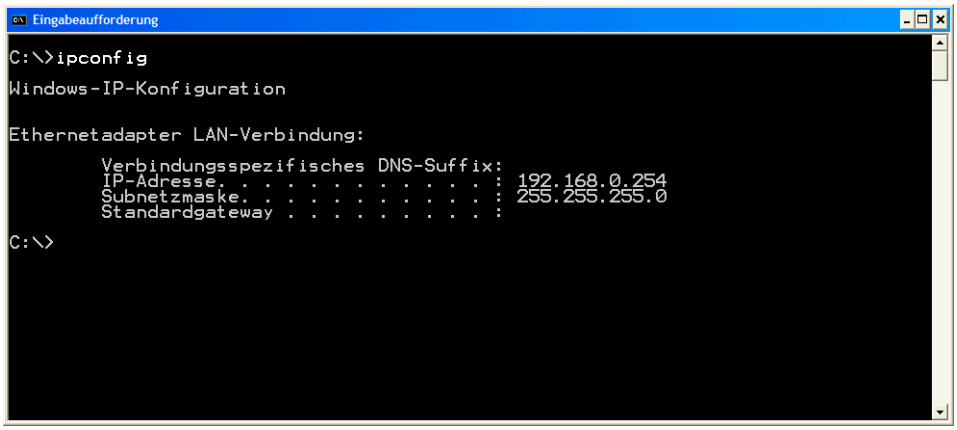


Figure 5-8: Communication check via ipconfig command

Once the ping was successful, you are ready to start a web browser on your development PC. This browser may be the MS Internet Explorer or a different suitable web browser like Netscape or Opera or similar.

5.3 Web Server Access

Start a web browser and open the URL *http://192.168.0.126*. The embedded web server will deliver you a small description about the DNP/5282 inside of the IGW/800. That's it. Now you are online with the IGW/800 and your web browser is connected to the embedded web server of the DNP/5282 inside of the IGW/800. It shows you a static web page with some pictures.

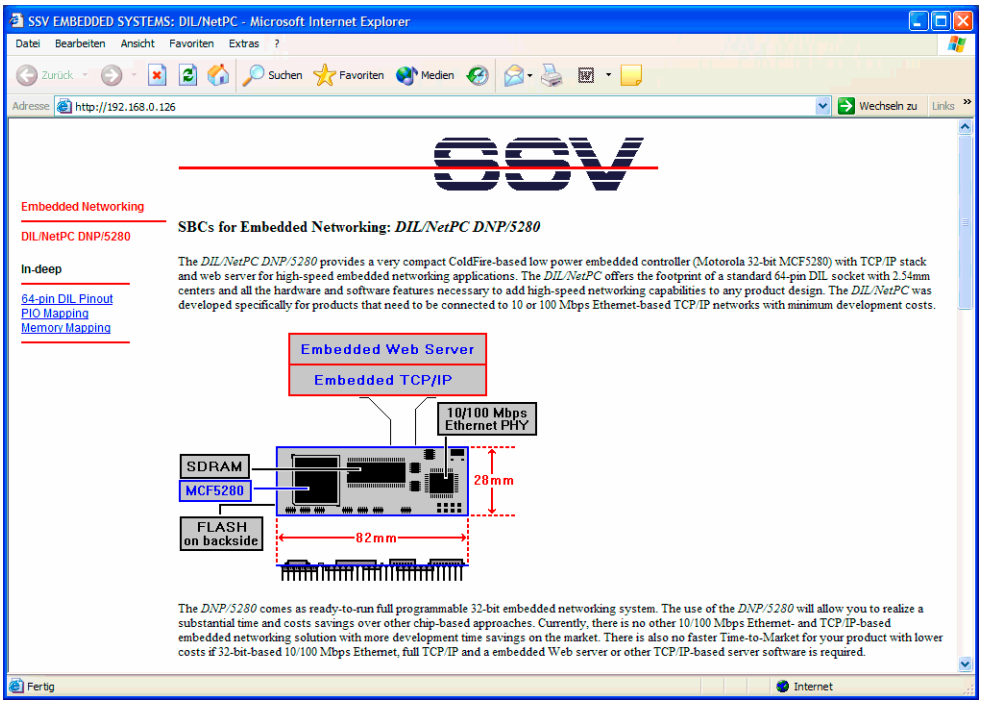

SSV EMBEDDED SYSTEMS: DIL/NetPC - Microsoft Internet Explorer
Datei Bearbeiten Ansicht Favoriten Extras ?
Zurück Suchen Favoriten Medien
Adresse http://192.168.0.126
Wechseln zu Links
Embedded Networking
DIL/NetPC DNP/5280
In-deep
64-pin DIL Pinout
PIO Mapping
Memory Mapping
SBCs for Embedded Networking: DIL/NetPC DNP/5280
The DIL/NetPC DNP/5280 provides a very compact ColdFire-based low power embedded controller (Motorola 32-bit MCF5280) with TCP/IP stack and web server for high-speed embedded networking applications. The DIL/NetPC offers the footprint of a standard 64-pin DIL socket with 2.54mm centers and all the hardware and software features necessary to add high-speed networking capabilities to any product design. The DIL/NetPC was developed specifically for products that need to be connected to 10 or 100 Mbps Ethernet-based TCP/IP networks with minimum development costs.
Embedded Web Server
Embedded TCP/IP
10/100 Mbps Ethernet PHY
SDRAM
MCF5280
FLASH on backside
28mm
82mm
The DNP/5280 comes as ready-to-run full programmable 32-bit embedded networking system. The use of the DNP/5280 will allow you to realize a substantial time and costs savings over other chip-based approaches. Currently, there is no other 10/100 Mbps Ethernet- and TCP/IP-based embedded networking solution with more development time savings on the market. There is also no faster Time-to-Market for your product with lower costs if 32-bit-based 10/100 Mbps Ethernet, full TCP/IP and a embedded Web server or other TCP/IP-based server software is required.
Fertig
Internet

Figure 5-9: Web page shown by the MS-Internet Explorer

If your web browser can't establish a connection to the web server – but the Ping was successful – you should check your browser settings. Please ensure that your browser is joined with TCP/IP by using the Ethernet card in your host. Alternatively you have to install a suitable web browser.

Please make sure that your web browser does not use an Internet proxy server for http-requests. See the web browser connection settings for further details.

In some cases the web browser is only configured for modem based Internet access. In this case, please install a second web browser from your original operating system CD-ROM.

5.4 Assigning a new IP-Address to the IGW/800

The following steps describe how to change the IP-address of the DNP/5282 inside of the IGW/800 with a terminal program like the HyperTerminal-program in MS-Windows.

Note: Please make sure that RCM on the IGW/800 is enabled for further operation. Please see **chapter 4.7** how to enable RCM correctly.

When the DNP/5282 inside of the IGW/800 has booted with RCM permanently enabled you should see the following screen on your terminal program.

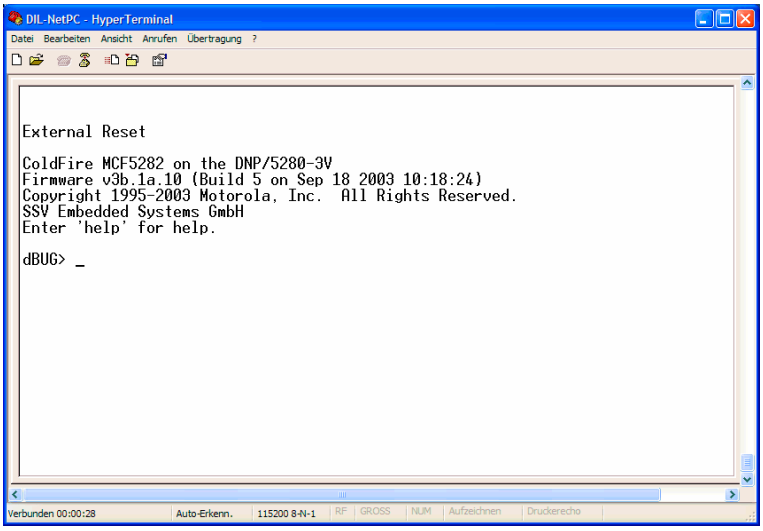


Figure 5-10: Boot process with RCM jumper set

Now enter the command ***show*** to see the current parameters of the DNP/5282 inside of the IGW/800. To assign a different IP-address (e.g. the IP-address 192.168.0.100) use the Linux commands ***set client 192.168.0.100*** and ***set netmask 255.255.255.0***. Please check if the IP address matches with the IP address range used in your company/network.

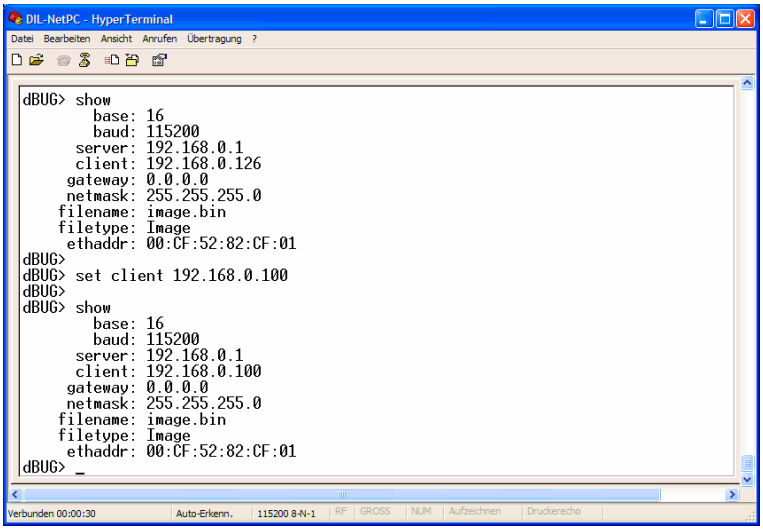


Figure 5-11: Assigning a new IP-address to the DNP/5282

Probably you have to change other parameters as well. The next figure shows you how to use the command set with different parameters.

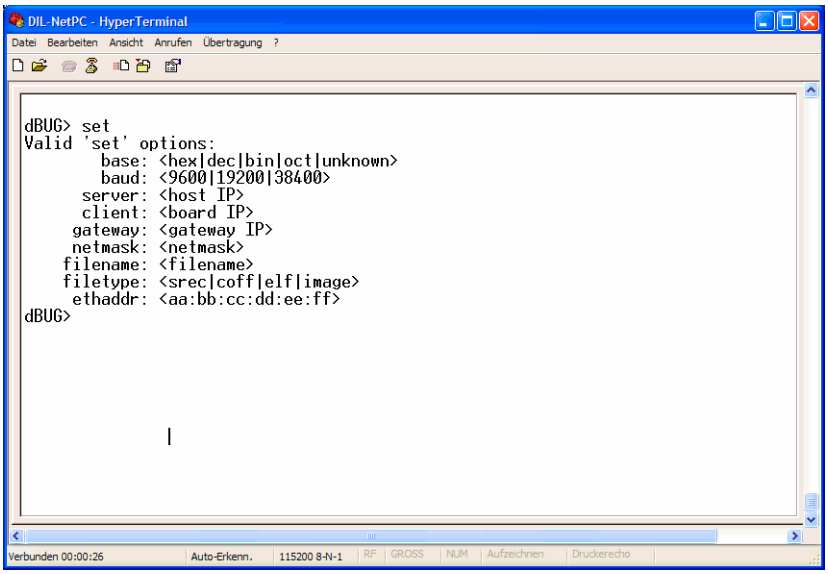


Figure 5-12: Command set with parameters

5.5 Running Linux

The DNP/5282 inside of the IGW/800 is delivered with a pre-installed Linux. When booting make sure RCM of the IGW/800 is disabled. When the Linux boot process is done the system will stop with the login prompt shown in **figure 5-13**.

The DNP/5282 Linux does not need a user login with user name and password. Just enter your Linux commands directly after the boot process.

Note: On every boot process without RCM enabled (please see **chapter 4.7**) there is a serial console available with following parameters: 115.200 bps, no parity, 8 data bits, 1 stop bit, no handshake.

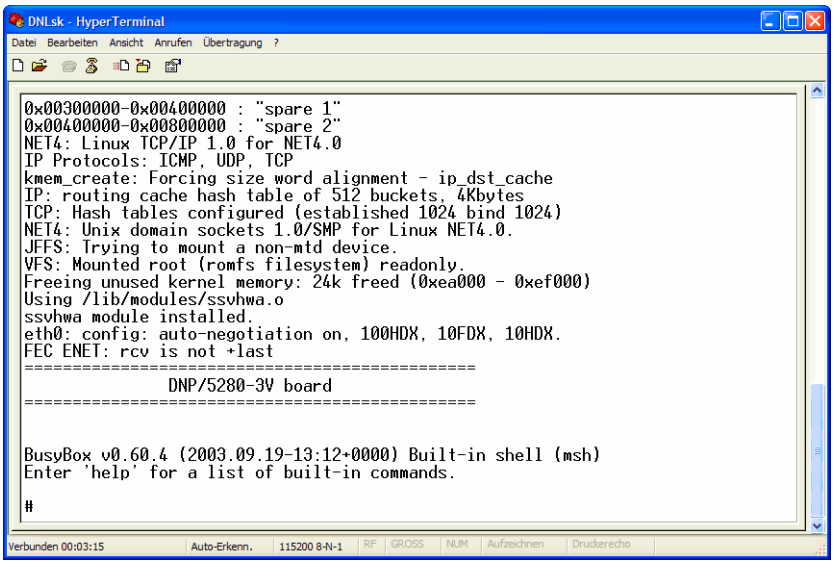

DNLsk - HyperTerminal
Datei Bearbeiten Ansicht Anrufen Übertragung ?
0x00300000-0x00400000 : "spare 1"
0x00400000-0x00800000 : "spare 2"
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
kmem_create: Forcing size word alignment - ip_dst_cache
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 1024 bind 1024)
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
JFFS: Trying to mount a non-mtd device.
VFS: Mounted root (romfs filesystem) readonly.
Freeing unused kernel memory: 24k freed (0xea000 - 0xef000)
Using /lib/modules/ssvhwa.o
ssvhwa module installed.
eth0: config: auto-negotiation on, 100HDX, 10FDX, 10HDX.
FEC ENET: rcv is not +last
DNP/5280-3V board
BusyBox v0.60.4 (2003.09.19-13:12+0000) Built-in shell (msh)
Enter 'help' for a list of built-in commands.
#
Verbunden 00:03:15
Auto-Erkenn.
115200 8-N-1
RF
GROSS
NUM
Aufzeichnen
Druckerecho

Figure 5-13: DNP/5282 Linux boot process

Alternatively you can use a **command line interface (CLI)** like a Telnet client to communicate with the IGW/800. Open for example a DOS window in MS-Windows and type in the command ***telnet 192.168.0.126***.

If you have already assigned a different IP-address to the IGW/800 you need to enter this new IP-address in the command line.

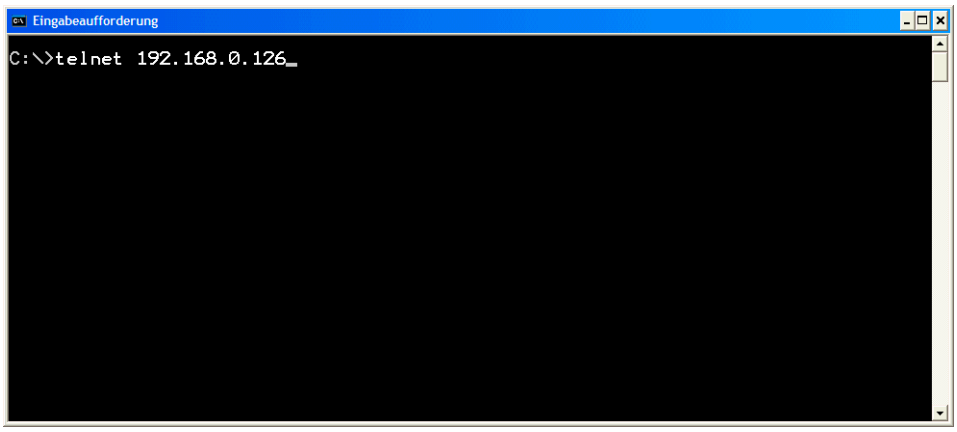


Figure 5-14: Running the MS-Windows Telnet client

Within the Telnet client you can enter Linux commands that will be executed by the IGW/800. The standard output will be shown in your Telnet client window as illustrated in the next figure.

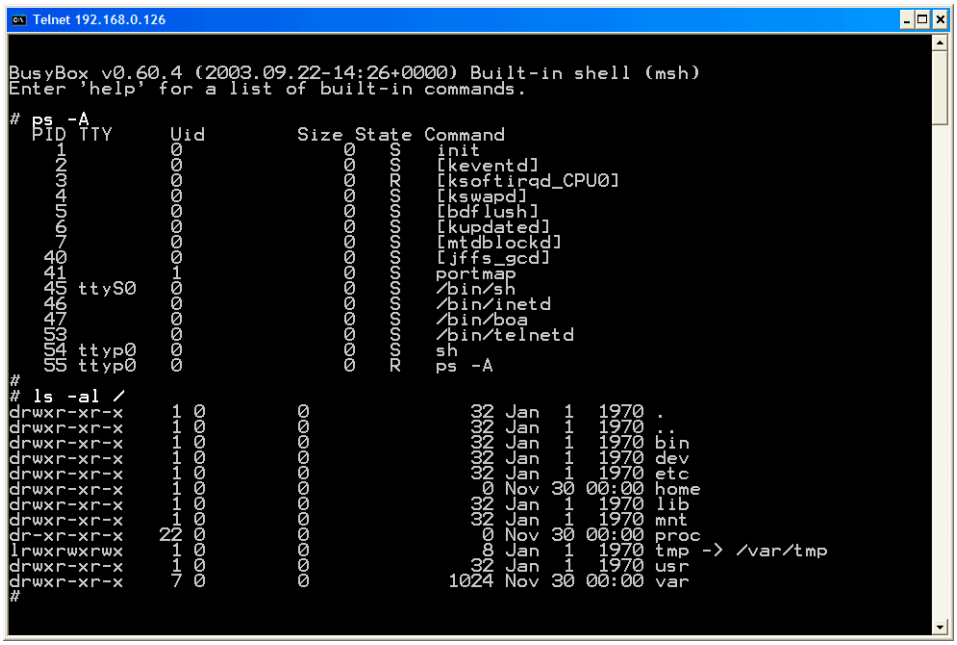

Telnet 192.168.0.126
BusyBox v0.60.4 (2003.09.22-14:26+0000) Built-in shell (msh)
Enter 'help' for a list of built-in commands.
ps -A
PID TTY Uid Size State Command
1 0 0 S init
2 0 0 S [keventd]
3 0 0 R [ksoftirqd_CPU0]
4 0 0 S [kswapd]
5 0 0 S [bdflush]
6 0 0 S [kupdated]
7 0 0 S [mtdblockd]
40 0 0 S [jffs_gcd]
41 1 0 S portmap
45 ttyS0 0 0 S /bin/sh
46 0 0 S /bin/inetd
47 0 0 S /bin/boa
53 0 0 S /bin/telnetd
54 ttyp0 0 0 S sh
55 ttyp0 0 0 R ps -A
#
ls -al /
drwxr-xr-x 1 0 0 32 Jan 1 1970 .
drwxr-xr-x 1 0 0 32 Jan 1 1970 ..
drwxr-xr-x 1 0 0 32 Jan 1 1970 bin
drwxr-xr-x 1 0 0 32 Jan 1 1970 dev
drwxr-xr-x 1 0 0 32 Jan 1 1970 etc
drwxr-xr-x 1 0 0 0 Nov 30 00:00 home
drwxr-xr-x 1 0 0 32 Jan 1 1970 lib
drwxr-xr-x 1 0 0 32 Jan 1 1970 mnt
dr-xr-xr-x 22 0 0 0 Nov 30 00:00 proc
lrwxrwxrwx 1 0 0 8 Jan 1 1970 tmp -> /var/tmp
drwxr-xr-x 1 0 0 32 Jan 1 1970 usr
drwxr-xr-x 7 0 0 1024 Nov 30 00:00 var
#

Figure 5-15: Enter Linux commands via Telnet

Note: You can enter Linux commands in different command line interfaces (CLI) like a serial console (e.g. HyperTerminal, Minicom) or a Telnet client.

5.6 Filetransfer via TFTP

The DNP/5282 inside of the IGW/800 offers a very simple way for Ethernet-based file transfers between your PC system and the DNP/5282 RAM disk drives or JFFS-based flash disk drives. This file transfer is using the TCP/IP service **TFTP (trivial file transfer protocol)**.

TFTP is a server/client-based protocol. The DNP/5282 Linux configuration offers a TFTP client program. Your PC needs a TFTP server program.

Note: Windows-based PCs do not offer TFTP server programs. Only special server versions of MS Windows come with a TFTP server program. For all other Windows-based PCs you find the TFTP server program **TFTPD32** in the directory ***\TFTPServer-Win32*** on your Starter Kit CD-ROM. Copy all files from ***\TFTP-Server-Win32*** to a new directory on your Windows-based PC hard disk drive. **TFTPD32** is a free, non-commercial product. Please watch the license.

First you have to setup an Ethernet link between the IGW/800 10/100 Mbps Ethernet interface and the Ethernet interface of your PC system. Check the IP address of your Windows PC system with the ***ipconfig*** command. The default IP address (factory setup) of the DNP/5282 inside of the IGW/800 is **192.168.0.126**.

Now run the TFTP server program on your PC system.

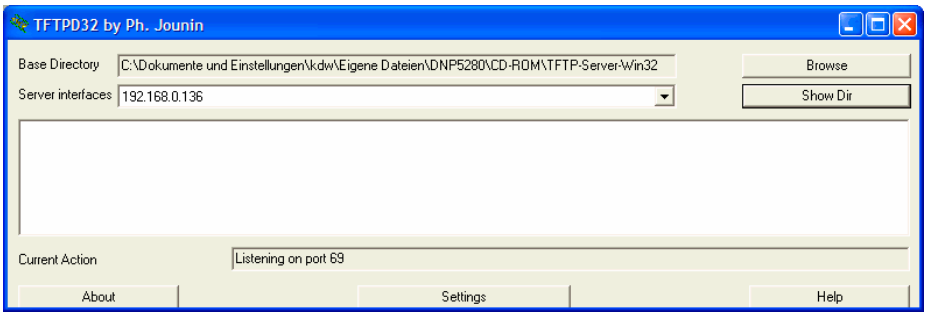


Figure 5-16: Running TFTPD32

Check the TFTP connection between the IGW/800 and your PC system. Open a Telnet session and use the following commands for downloading and uploading files:

tftp –g –l file.name ip-addr
tftp –p –l file.name ip-addr

The command ***tftp*** is the name of the DNP/5282 TFTP client program.

The parameter ***–g*** stands for get (get a file from the PC system to the DNP/5282).

The parameter ***–p*** stands for put (put a file from the DNP/5282 to the PC system).

The parameter ***–l*** file.name specifies the file for put or get.

The parameter ***ip-addr*** stands for the IP address of your PC system (i.e. 192.168.0.1).

Most TFTP server programs work with a default directory for put and get commands. Each TFTP put command writes a file to this directory. Each TFTP get command reads the file from this directory on your PC system. For TFTPD32 you can change this directory with the browse button.

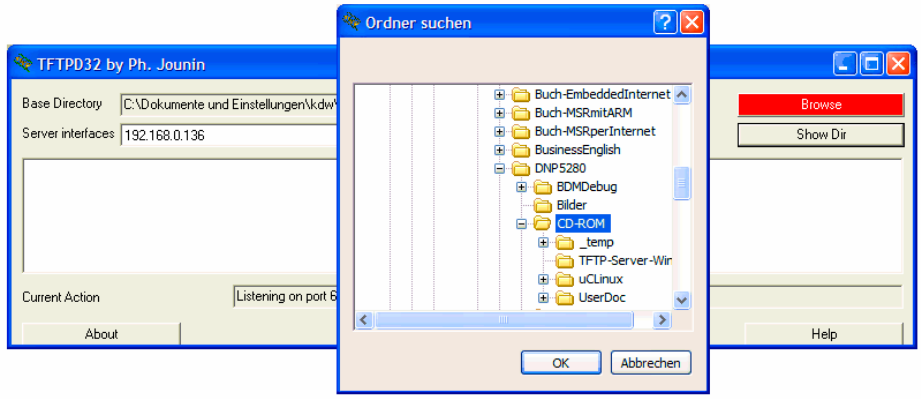


Figure 5-17: Changing the default directory for TFTPD32

Example:

The following picture shows the use of the DNP/5282 TFTP client within a Telnet session.

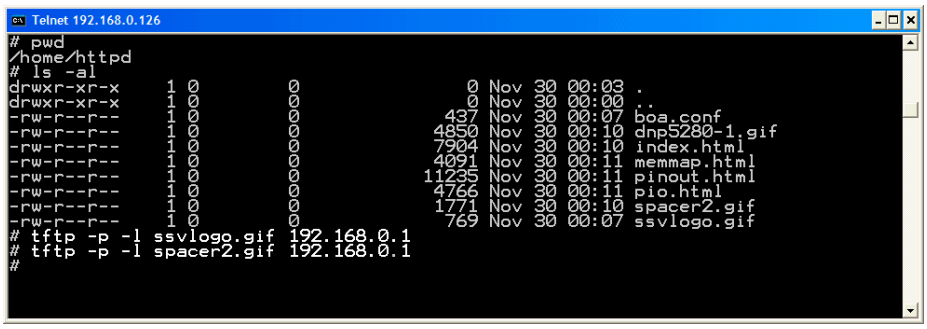

Telnet 192.168.0.126
pwd
/home/httpd
ls -al
drwxr-xr-x 1 0 0 0 Nov 30 00:03 .
drwxr-xr-x 1 0 0 0 Nov 30 00:00 ..
-rw-r--r-- 1 0 0 437 Nov 30 00:07 boa.conf
-rw-r--r-- 1 0 0 4850 Nov 30 00:10 dnp5280-1.gif
-rw-r--r-- 1 0 0 7904 Nov 30 00:10 index.html
-rw-r--r-- 1 0 0 4091 Nov 30 00:11 memmap.html
-rw-r--r-- 1 0 0 11235 Nov 30 00:11 pinout.html
-rw-r--r-- 1 0 0 4766 Nov 30 00:11 pio.html
-rw-r--r-- 1 0 0 1771 Nov 30 00:10 spacer2.gif
-rw-r--r-- 1 0 0 769 Nov 30 00:07 ssvlogo.gif
tftp -p -l ssvlogo.gif 192.168.0.1
tftp -p -l spacer2.gif 192.168.0.1
#

Figure 5-18: Using the DNP/5282 TFTP client within a Telnet session

Note: A file transfer to the DNP/5282 inside of the IGW/800 must be started with a Telnet session from RAM disk or JFFS-based flash disk directories. You need R/W access for the TFTP get command.

6 USING A LINUX-BASED HOST

The “heart” of the IGW/800 is the programmable DIL/NetPC DNP/5282. The following paragraphs will help you to use the DNP/5282 with a host running under Linux. For these steps you will need a terminal program, which normally comes along with the Linux installation (i.e. **Minicom**). Please make sure that this program is present on your host.
If necessary you have to install this program from your Linux installation CD-ROM.

Note: In some following screenshots you will find the term “DNP/5280”, but that does not matter. The µCLinux for the DNP/5280 and for the DNP/5282 is the same!

6.1 Setup the Serial Link

Before you provide the IGW/800 with power for the first time, please run a terminal program like Minicom. Minicom is a simple serial communication program originally written by Miquel van Smoorenburg. It offers basic communication capabilities and integrates well with the Linux user interface. Minicom is a lot like the old MS-DOS program PROCOMM. This program can be used to connect a Linux-based PC to embedded devices such as the DNP/5282 inside of the IGW/800 for initial configurations. In the following we will show you how to use Minicom and what you have to do to adjust the necessary settings.

Open a terminal window and type in the command ***minicom -s*** to get access to the serial port settings. Now you can change some configuration parameters – such as the maximum baud rate. Set the serial port parameters for the maximum baud rate on "115.200 bps".

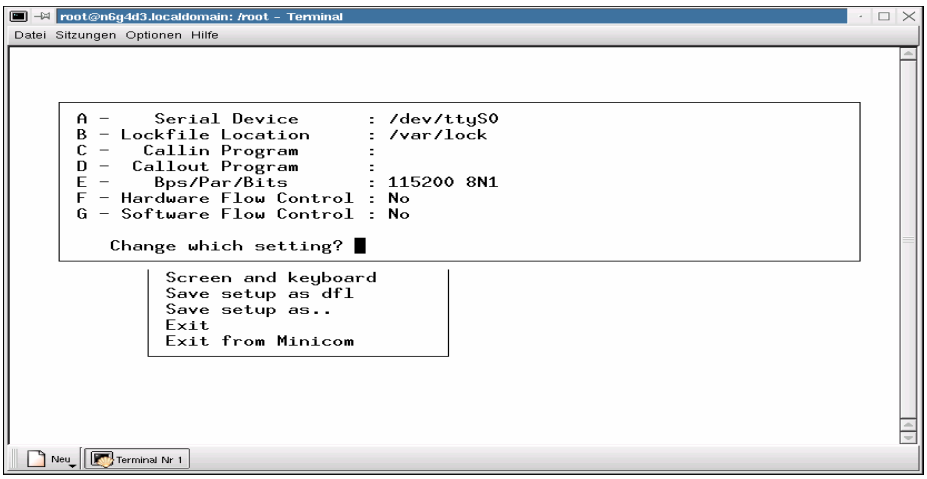

root@n6g4d3.localdomain: /root - Terminal
Datei Sitzungen Optionen Hilfe
A - Serial Device : /dev/ttyS0
B - Lockfile Location : /var/lock
C - Callin Program :
D - Callout Program :
E - Bps/Par/Bits : 115200 8N1
F - Hardware Flow Control : No
G - Software Flow Control : No
Change which setting?
Screen and keyboard
Save setup as dfl
Save setup as..
Exit
Exit from Minicom
Neu
Terminal Nr 1

Figure 6-1: Serial port settings under Minicom

Now turn on the power for the IGW/800 and you will see all steps of the boot process in the terminal program window at your PC. If you do not see the following boot process, please make sure that RCM on the IGW/800 is disabled (please see **chapter 4.7** for detailed information).

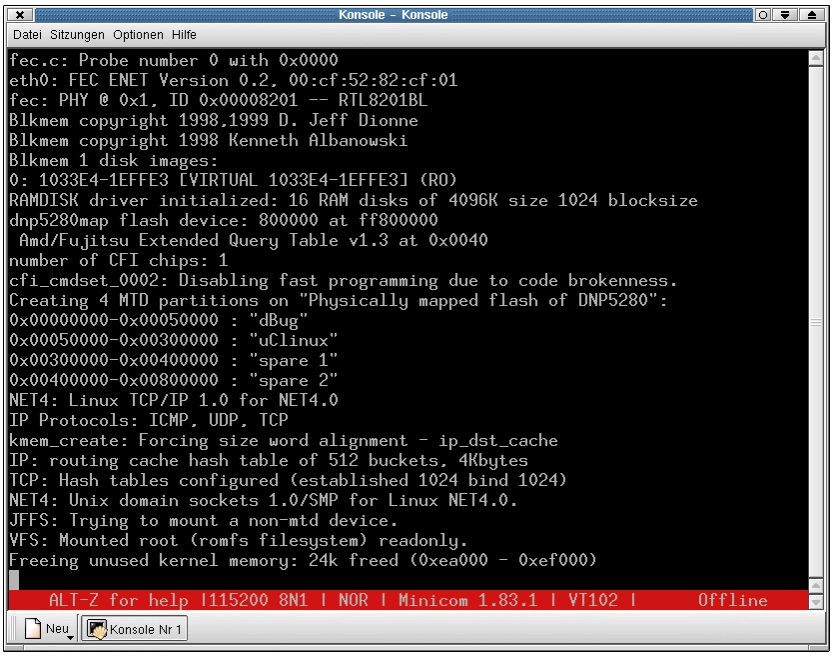

Konsole - Konsole
Datei Sitzungen Optionen Hilfe
fec.c: Probe number 0 with 0x0000
eth0: FEC ENET Version 0.2, 00:cf:52:82:cf:01
fec: PHY @ 0x1, ID 0x00008201 -- RTL8201BL
Blkmem copyright 1998,1999 D. Jeff Dionne
Blkmem copyright 1998 Kenneth Albanowski
Blkmem 1 disk images:
0: 1033E4-1EFFE3 [VIRTUAL 1033E4-1EFFE3] (RO)
RAMDISK driver initialized: 16 RAM disks of 4096K size 1024 blocksize
dnp5280map flash device: 800000 at ff800000
Amd/Fujitsu Extended Query Table v1.3 at 0x0040
number of CFI chips: 1
cfi_cmdset_0002: Disabling fast programming due to code brokenness.
Creating 4 MTD partitions on "Physically mapped flash of DNP5280":
0x00000000-0x00050000 : "dBug"
0x00050000-0x00300000 : "uClinux"
0x00300000-0x00400000 : "spare 1"
0x00400000-0x00800000 : "spare 2"
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
kmem_create: Forcing size word alignment - ip_dst_cache
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 1024 bind 1024)
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
JFFS: Trying to mount a non-mtd device.
VFS: Mounted root (romfs filesystem) readonly.
Freeing unused kernel memory: 24k freed (0xea000 - 0xef000)
ALT-Z for help |115200 8N1 | NOR | Minicom 1.83.1 | VT102 | Offline
Neu
Konsole Nr 1

Figure 6-2: Linux boot process

After the self test sequence is done the Linux boot process will be initialized. When finished, you will see the following screen with a Linux prompt waiting for a user input.

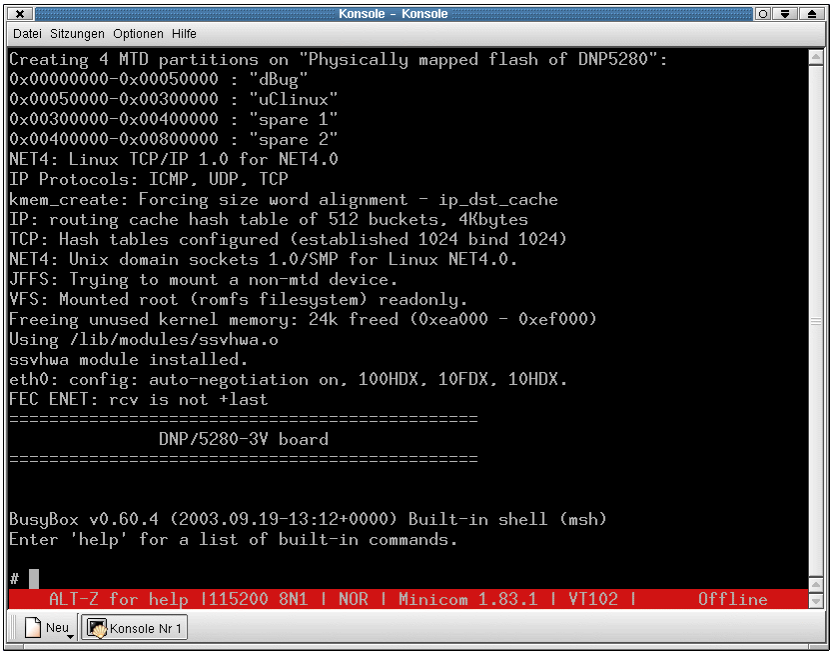

Konsole - Konsole
Datei Sitzungen Optionen Hilfe
Creating 4 MTD partitions on "Physically mapped flash of DNP5280":
0x00000000-0x00050000 : "dBug"
0x00050000-0x00300000 : "uClinux"
0x00300000-0x00400000 : "spare 1"
0x00400000-0x00800000 : "spare 2"
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
kmem_create: Forcing size word alignment - ip_dst_cache
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 1024 bind 1024)
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
JFFS: Trying to mount a non-mtd device.
VFS: Mounted root (romfs filesystem) readonly.
Freeing unused kernel memory: 24k freed (0xea000 - 0xef000)
Using /lib/modules/ssvhwa.o
ssvhwa module installed.
eth0: config: auto-negotiation on, 100HDX, 10FDX, 10HDX.
FEC ENET: rcv is not +last
DNP/5280-3V board
BusyBox v0.60.4 (2003.09.19-13:12+0000) Built-in shell (msh)
Enter 'help' for a list of built-in commands.
#
ALT-Z for help |115200 8N1 | NOR | Minicom 1.83.1 | VT102 | Offline
Neu
Konsole Nr 1

Figure 6-3: Linux command prompt

6.2 Checking the Ethernet Link

Please open a shell window and type in ***ping 192.168.0.126***. Every ping request has to be answered by your DNP/5282 inside of the IGW/800 similar as shown below.

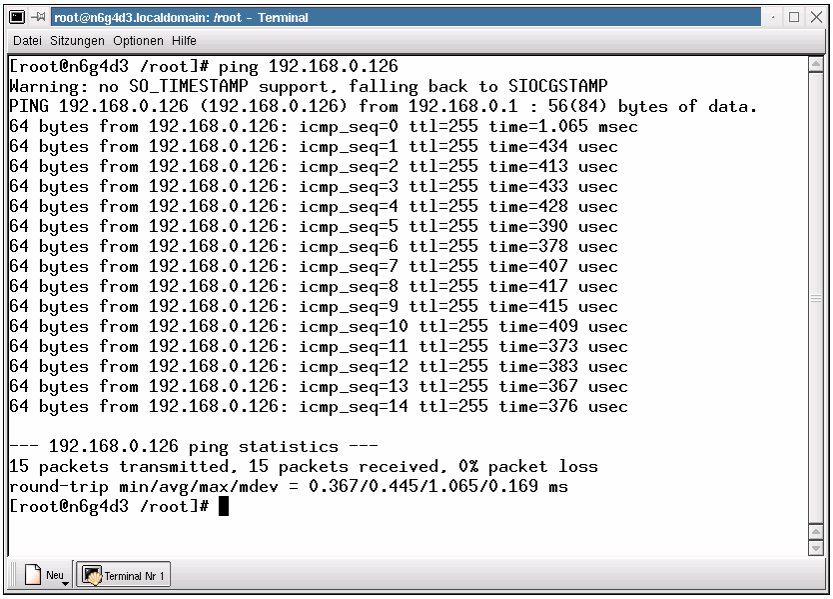

root@n6g4d3.localdomain: /root - Terminal
Datei Sitzungen Optionen Hilfe
[root@n6g4d3 /root]# ping 192.168.0.126
Warning: no SO_TIMESTAMP support, falling back to SIOCGSTAMP
PING 192.168.0.126 (192.168.0.126) from 192.168.0.1 : 56(84) bytes of data.
64 bytes from 192.168.0.126: icmp_seq=0 ttl=255 time=1.065 msec
64 bytes from 192.168.0.126: icmp_seq=1 ttl=255 time=434 usec
64 bytes from 192.168.0.126: icmp_seq=2 ttl=255 time=413 usec
64 bytes from 192.168.0.126: icmp_seq=3 ttl=255 time=433 usec
64 bytes from 192.168.0.126: icmp_seq=4 ttl=255 time=428 usec
64 bytes from 192.168.0.126: icmp_seq=5 ttl=255 time=390 usec
64 bytes from 192.168.0.126: icmp_seq=6 ttl=255 time=378 usec
64 bytes from 192.168.0.126: icmp_seq=7 ttl=255 time=407 usec
64 bytes from 192.168.0.126: icmp_seq=8 ttl=255 time=417 usec
64 bytes from 192.168.0.126: icmp_seq=9 ttl=255 time=415 usec
64 bytes from 192.168.0.126: icmp_seq=10 ttl=255 time=409 usec
64 bytes from 192.168.0.126: icmp_seq=11 ttl=255 time=373 usec
64 bytes from 192.168.0.126: icmp_seq=12 ttl=255 time=383 usec
64 bytes from 192.168.0.126: icmp_seq=13 ttl=255 time=367 usec
64 bytes from 192.168.0.126: icmp_seq=14 ttl=255 time=376 usec
--- 192.168.0.126 ping statistics ---
15 packets transmitted, 15 packets received, 0% packet loss
round-trip min/avg/max/mdev = 0.367/0.445/1.065/0.169 ms
[root@n6g4d3 /root]#
Neu
Terminal Nr 1

Figure 6-4: Ping request

To cancel the ping request just press the keyboard shortcut CONTROL + C. If an error occurs (e.g. the DNP/5282 does not answer the ping of your host) you have to check your cable connections at first.

Note: For a first test of the DNP/5282 you have to change the assigned IP-address of your host to ***192.168.0.1***. Please make sure, that you do not use another IP-address – this could lead to different network problems.

For an easy check if the IP-address is set correctly to "192.168.0.1", you can use the Linux-command ***ifconfig***.

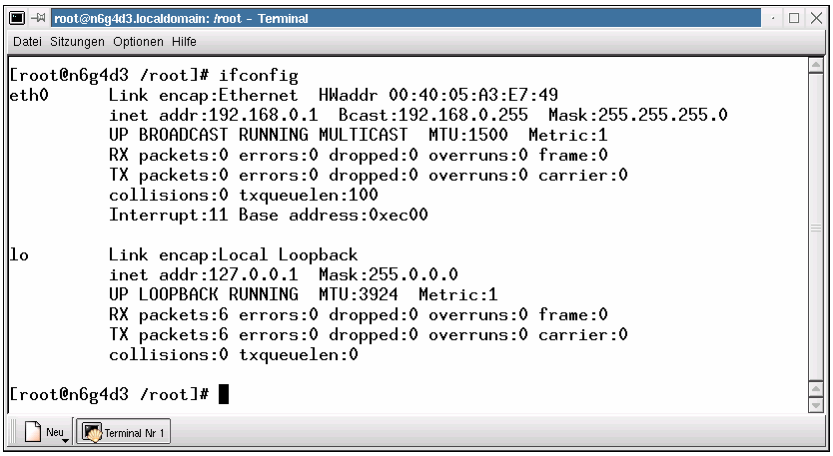


Figure 6-5: IP-address check via ifconfig

6.3 Web Server Access

Once the ping was successful, you are ready to start a web browser on your development system. This may be the Konqueror file manager or the Netscape Communicator/Navigator. The Konqueror file manager is normally part of the Linux installation and acts as file manager as well as web browser. Konqueror is able to detect automatically when an URL is entered and shows the content.

Just enter the URL ***http://192.168.0.126*** and press ENTER. The embedded web server will deliver you a small description about the DNP/5282 inside of the IGW/800.

That's it. You are now online with the IGW/800. The web browser of your development system is connected to the embedded web server of the DNP/5282 inside of the IGW/800 and shows you a static web page with some pictures.

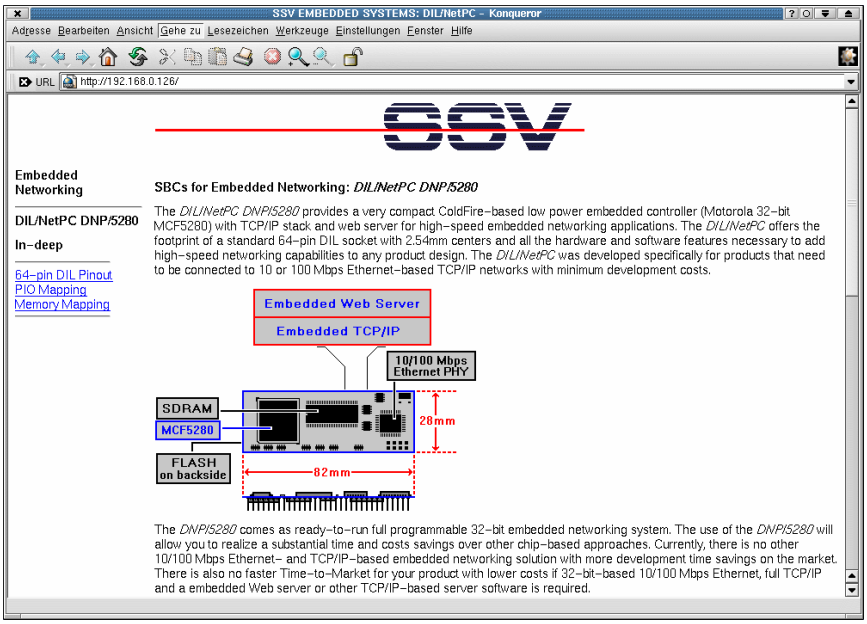

SSV EMBEDDED SYSTEMS: DIL/NetPC - Konqueror
Adresse Bearbeiten Ansicht Gehe zu Lesezeichen Werkzeuge Einstellungen Fenster Hilfe
URL http://192.168.0.126/
Embedded Networking
DIL/NetPC DNP/5280
In-deep
64-pin DIL Pinout
PIO Mapping
Memory Mapping
SBCs for Embedded Networking: DIL/NetPC DNP/5280
The DIL/NetPC DNP/5280 provides a very compact ColdFire-based low power embedded controller (Motorola 32-bit MCF5280) with TCP/IP stack and web server for high-speed embedded networking applications. The DIL/NetPC offers the footprint of a standard 64-pin DIL socket with 2.54mm centers and all the hardware and software features necessary to add high-speed networking capabilities to any product design. The DIL/NetPC was developed specifically for products that need to be connected to 10 or 100 Mbps Ethernet-based TCP/IP networks with minimum development costs.
Embedded Web Server
Embedded TCP/IP
10/100 Mbps Ethernet PHY
SDRAM
MCF5280
FLASH on backside
28mm
82mm
The DNP/5280 comes as ready-to-run full programmable 32-bit embedded networking system. The use of the DNP/5280 will allow you to realize a substantial time and costs savings over other chip-based approaches. Currently, there is no other 10/100 Mbps Ethernet- and TCP/IP-based embedded networking solution with more development time savings on the market. There is also no faster Time-to-Market for your product with lower costs if 32-bit-based 10/100 Mbps Ethernet, full TCP/IP and a embedded Web server or other TCP/IP-based server software is required.

Figure 6-6: Web page shown by the Konqueror File Manager

6.4 Assigning a new IP-Address to the IGW/800

The following steps describe how to change the IP-address of the DNP/5282 with a command line interface like Minicom in Linux.

Note: Please make sure that RCM on the IGW/800 is disabled for further operation. Please see **chapter 4.7** how to enable RCM correctly.

When the IGW/800 has booted with RCM enabled you should see the following messages on your terminal program.

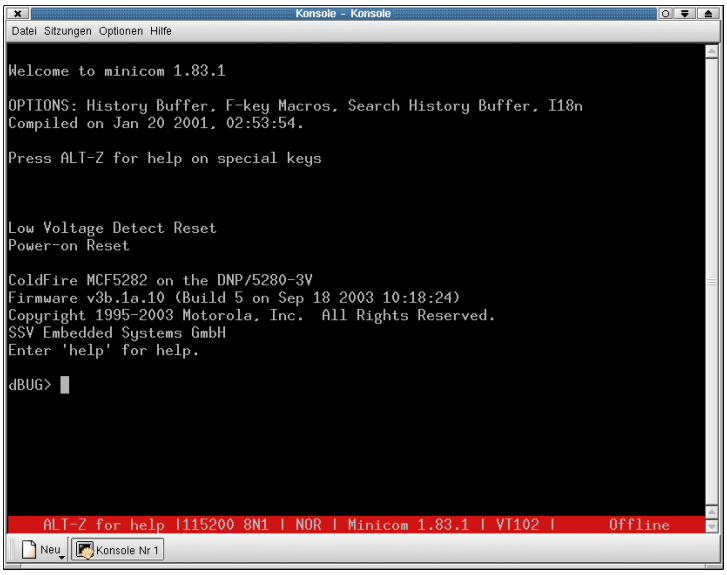

Konsole – Konsole
Datei Sitzungen Optionen Hilfe
Welcome to minicom 1.83.1
OPTIONS: History Buffer, F-key Macros, Search History Buffer, I18n
Compiled on Jan 20 2001, 02:53:54.
Press ALT-Z for help on special keys
Low Voltage Detect Reset
Power-on Reset
ColdFire MCF5282 on the DNP/5280-3V
Firmware v3b.1a.10 (Build 5 on Sep 18 2003 10:18:24)
Copyright 1995-2003 Motorola, Inc. All Rights Reserved.
SSV Embedded Systems GmbH
Enter 'help' for help.
dBUG>
ALT-Z for help |115200 8N1 | NOR | Minicom 1.83.1 | VT102 | Offline
Neu
Konsole Nr 1

Figure 6-7: Boot process with RCM enabled

Now enter the command ***show*** to see the current parameters of the DNP/5282 inside of the IGW/800. To assign a different IP-address (e.g. the IP-address 192.168.0.100) type in the command line ***set client 192.168.0.100***.

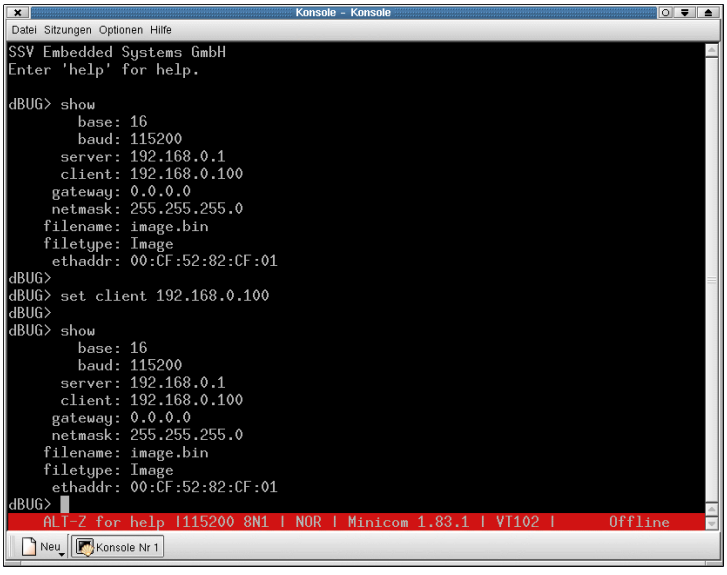


Figure 6-8: Assigning a new IP-address to the IGW/800

Probably you have to change other parameters as well. The next figure shows you how to use the command set with different parameters.

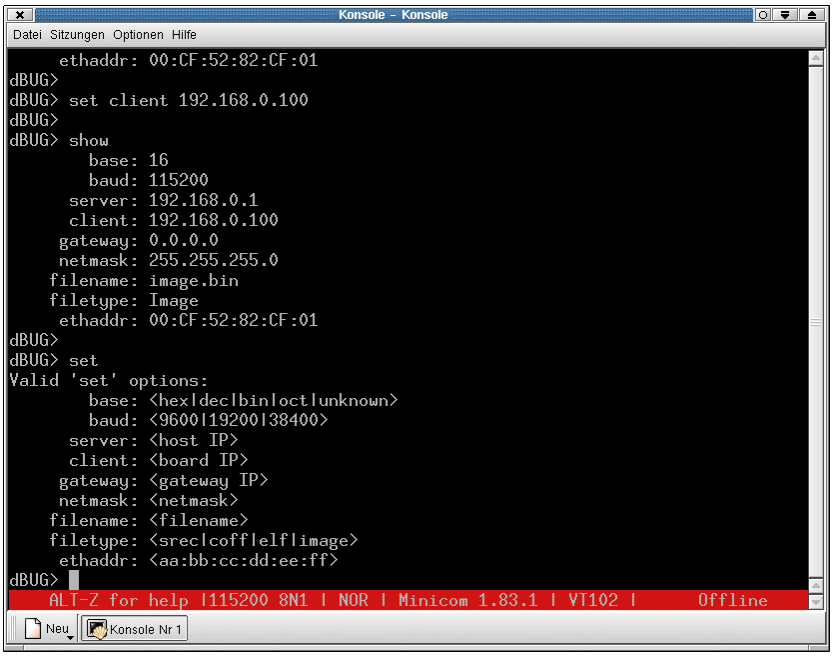


Figure 6-9: Command set with parameters

6.5 Running Linux

The DNP/5282 inside of the IGW/800 is delivered with a pre-installed Linux. When booting make sure RCM of the IGW/800 is disabled. When the Linux boot process is done the system will stop with the login prompt shown in the next figure. The DNP/5282 Linux does not need a user login with user name and password. Just enter your Linux commands directly after the boot process.

Note: On every boot process without RCM enabled (please see **chapter 4.7**) there is a serial console available with following parameters: 115.200 bps, No Parity, 8 Data Bits, 1 Stop Bit, No Handshake.

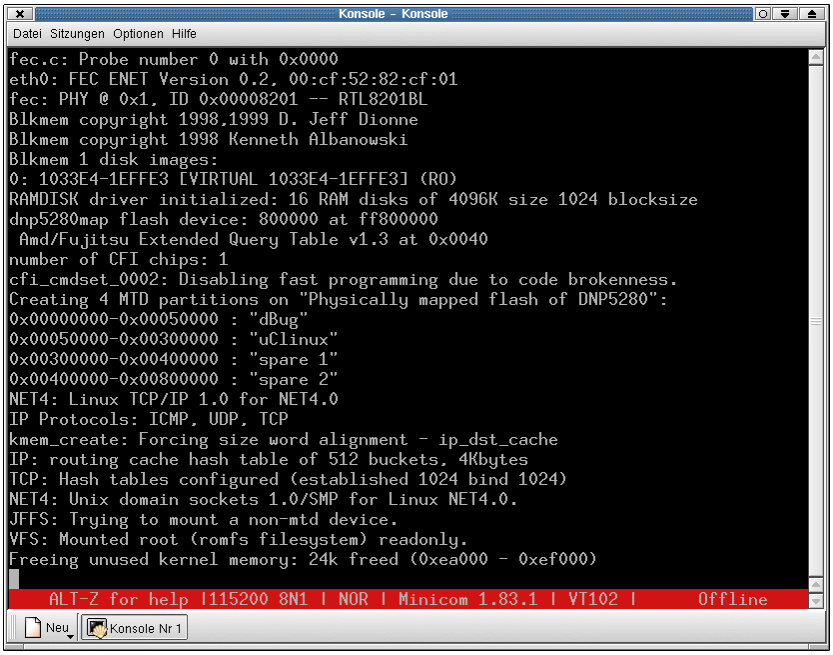

Konsole - Konsole
Datei Sitzungen Optionen Hilfe
fec.c: Probe number 0 with 0x0000
eth0: FEC ENET Version 0.2, 00:cf:52:82:cf:01
fec: PHY @ 0x1, ID 0x00008201 -- RTL8201BL
Blkmem copyright 1998,1999 D. Jeff Dionne
Blkmem copyright 1998 Kenneth Albanowski
Blkmem 1 disk images:
0: 1033E4-1EFFE3 [VIRTUAL 1033E4-1EFFE3] (RO)
RAMDISK driver initialized: 16 RAM disks of 4096K size 1024 blocksize
dnp5280map flash device: 800000 at ff800000
Amd/Fujitsu Extended Query Table v1.3 at 0x0040
number of CFI chips: 1
cfi_cmdset_0002: Disabling fast programming due to code brokenness.
Creating 4 MTD partitions on "Physically mapped flash of DNP5280":
0x00000000-0x00050000 : "dBug"
0x00050000-0x00300000 : "uClinux"
0x00300000-0x00400000 : "spare 1"
0x00400000-0x00800000 : "spare 2"
NET4: Linux TCP/IP 1.0 for NET4.0
IP Protocols: ICMP, UDP, TCP
kmem_create: Forcing size word alignment - ip_dst_cache
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 1024 bind 1024)
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
JFFS: Trying to mount a non-mtd device.
VFS: Mounted root (romfs filesystem) readonly.
Freeing unused kernel memory: 24k freed (0xea000 - 0xef000)
ALT-Z for help |115200 8N1 | NOR | Minicom 1.83.1 | VT102 | Offline
Neu
Konsole Nr 1

Figure 6-10: Linux boot process

Alternatively you can use a **command line interface (CLI)** like a Telnet client to communicate with the DNP/5282 inside of the IGW/800. Type in the command ***telnet 192.168.0.126***.

If you have already assigned a different IP-address to the DNP/5282 you need to enter this new IP-address in the command line.

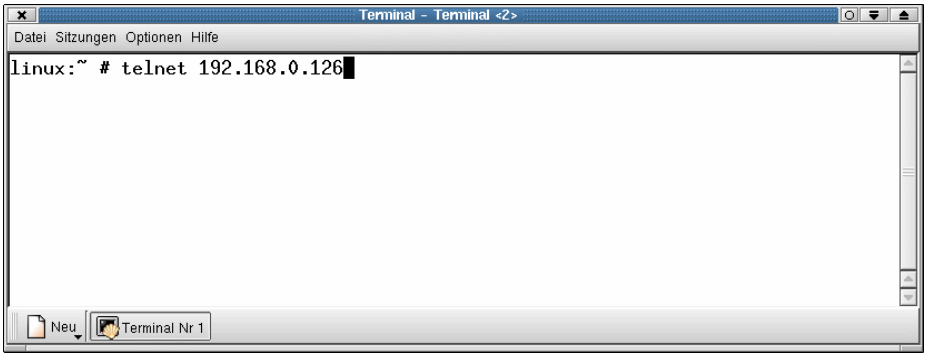


Figure 6-11: Linux login

Within the Telnet client you can enter Linux commands that will be executed by the DNP/5282 inside of the IGW/800. The standard output will be shown in your Telnet client window as illustrated in the next figure.

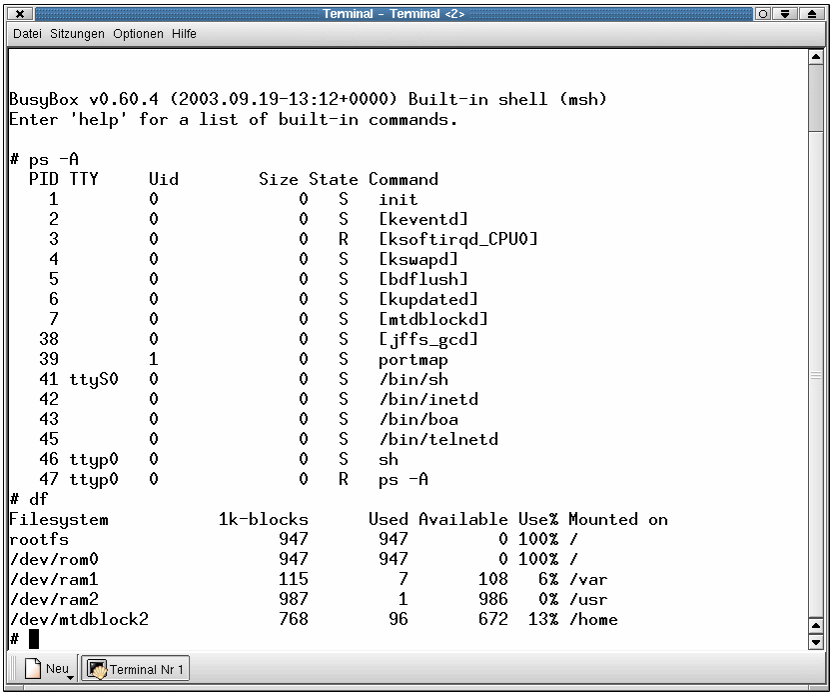

Terminal – Terminal <2>
Datei Sitzungen Optionen Hilfe
BusyBox v0.60.4 (2003.09.19-13:12+0000) Built-in shell (msh)
Enter 'help' for a list of built-in commands.
ps -A
PID TTY Uid Size State Command
1 0 0 S init
2 0 0 S [keventd]
3 0 0 R [ksoftirqd_CPU0]
4 0 0 S [kswapd]
5 0 0 S [bdflush]
6 0 0 S [kupdated]
7 0 0 S [mtdblockd]
38 0 0 S [jffs_gcd]
39 1 0 S portmap
41 ttyS0 0 0 S /bin/sh
42 0 0 S /bin/inetd
43 0 0 S /bin/boa
45 0 0 S /bin/telnetd
46 ttyp0 0 0 S sh
47 ttyp0 0 0 R ps -A
df
Filesystem 1k-blocks Used Available Use% Mounted on
rootfs 947 947 0 100% /
/dev/rom0 947 947 0 100% /
/dev/ram1 115 7 108 6% /var
/dev/ram2 987 1 986 0% /usr
/dev/mtdblock2 768 96 672 13% /home
#
Neu
Terminal Nr 1

Figure 6-12: Enter Linux commands via Telnet

Note: You can enter Linux commands in different command line interfaces (CLI), i.e. a serial console (like HyperTerminal or Minicom) or a Telnet client.

6.6 Filetransfer via TFTP

The DNP/5282 inside of the IGW/800 offers a very simple way for Ethernet-based file transfers between your PC system and the DNP/5282 RAM disk drives or JFFS-based flash disk drives. This file transfer is using the TCP/IP service **TFTP (Trivial File Transfer Protocol)**.

TFTP is server/client-based. The DNP/5282 Linux configuration offers a TFTP client program. Your PC needs a TFTP server program.

Setup an Ethernet link between theIGW/800 10/100 Mbps Ethernet interface and the Ethernet interface of your PC system. Check the IP address of the PC system with the Linux command ***ifconfig***. The default IP address (factory setup) of the DNP/5282 inside of the IGW/800 is 192.168.0.126.

Now run a TFTP server program on your PC system. Most Linux-based PCs come with a pre-installed TFTP server program. Some of these systems start this TFTP server program at boot time (the TFTP server is a part of the inetd service).

In all other cases you have to edit one or more configuration files (SuSE: ***/etc/inetd.conf***). See the user documentation of your Linux distribution for details.

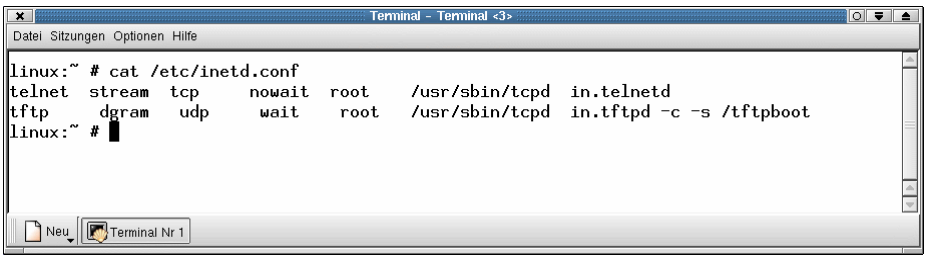

Terminal - Terminal <3>
Datei Sitzungen Optionen Hilfe
linux:~ # cat /etc/inetd.conf
telnet stream tcp nowait root /usr/sbin/tcpd in.telnetd
tftp dgram udp wait root /usr/sbin/tcpd in.tftpd -c -s /tftpboot
linux:~ #
Neu
Terminal Nr 1

Figure 6-13: Running TFTPD32

Check the TFTP connection between the DNP/5282 and your PC system. Open a Telnet session and use the following commands for downloading and uploading files:

tftp –g –l file.name ip-addr
tftp –p –l file.name ip-addr

The command ***tftp*** is the name of the DNP/5282 TFTP client program.

The parameter ***–g*** stands for get (get a file from the PC system to the DNP/5282).

The parameter ***–p*** stands for put (put a file from the DNP/5282 to the PC system).

The parameter ***–l*** file.name specifies the file for put or get.

The parameter ***ip-addr*** stands for the IP address of your PC system (i.e. 192.168.0.1).

Most TFTP server programs work with a default directory for put and get commands. Each TFTP put command writes a file to this directory. Each TFTP get command reads the file from this directory on your PC system. Most TFTP server programs allow you to change this directory.

Example:

The following picture shows the use of the DNP/5282 TFTP client within a Telnet session.

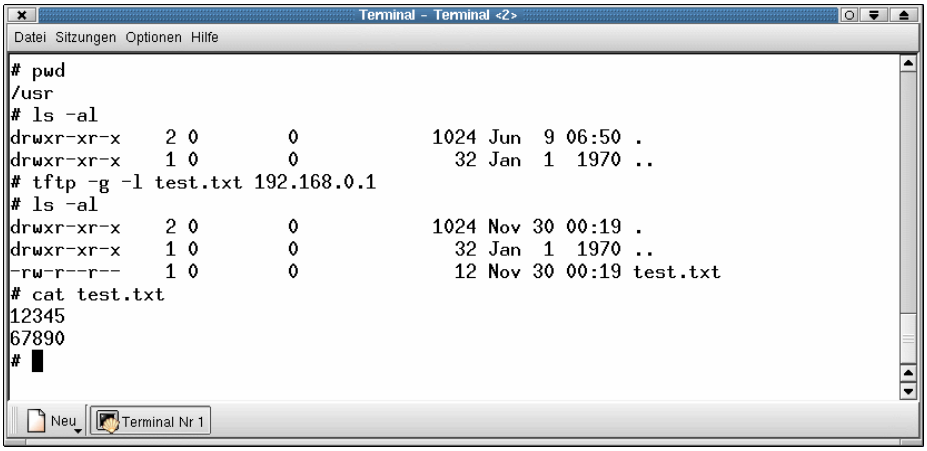

Terminal - Terminal <2>
Datei Sitzungen Optionen Hilfe
pwd
/usr
ls -al
drwxr-xr-x 2 0 0 1024 Jun 9 06:50 .
drwxr-xr-x 1 0 0 32 Jan 1 1970 ..
tftp -g -l test.txt 192.168.0.1
ls -al
drwxr-xr-x 2 0 0 1024 Nov 30 00:19 .
drwxr-xr-x 1 0 0 32 Jan 1 1970 ..
-rw-r--r-- 1 0 0 12 Nov 30 00:19 test.txt
cat test.txt
12345
67890
#
Neu
Terminal Nr 1

Figure 6-14: Using the DNP/5282 TFTP client within a Telnet session

Note: A file transfer to the DNP/5282 must be started with a Telnet session from RAM disk or JFFS-based flash disk directories. You need R/W access for the TFTP get command.

6.7 GNU Cross Tool Chain

This chapter describes how to install and use the Linux **GNU Cross Tool Chain** for DNP/5282 Linux C programming. You need administrator rights on your Linux PC for following these steps.

The GNU Cross Tool Chain for DNP/5282 Linux C programming comes within a Linux shell script file with the name *m68k-elf-tool-20030314.sh*. You find this file at the Starter Kit CD-ROM. The location of this 18 Mbytes shell script file is ***\µCLinux\Toolchain***.
Point your file manager to *m68k-elf-tool-20030314.sh*.

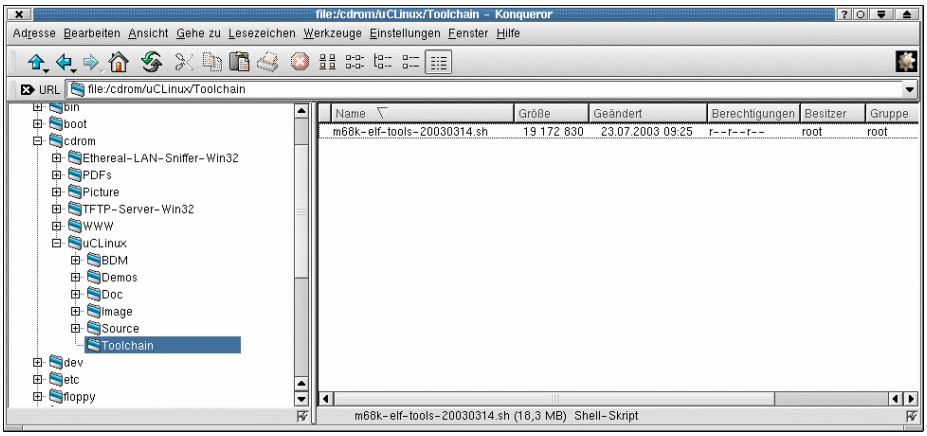


Figure 6-15: Location of m68k-elf-tool-20030314.sh at the DNP/SK14 CD-ROM

Now copy *m68k-elf-tool-20030314.sh* to your local hard disk drive. Change the file attributes to executable. For this task you can use the Linux command line:

chmod +x m68k-elf-tool-20030314.sh.

Some file managers offer simpler ways for attribute changing.

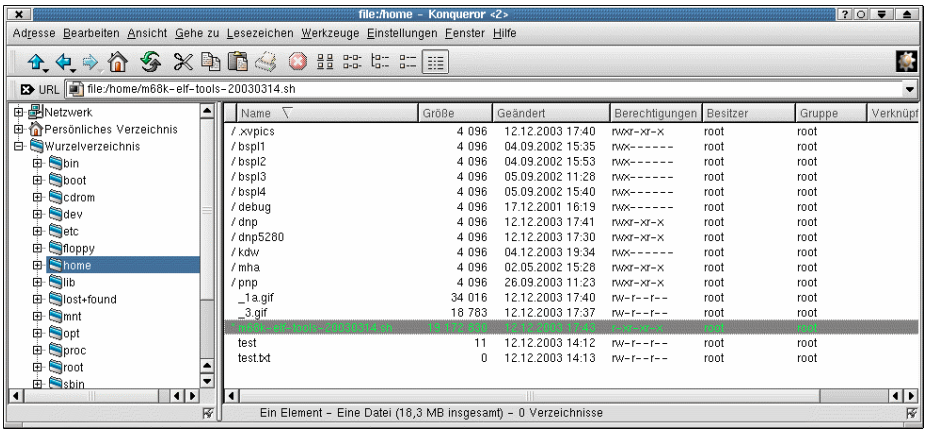

file:/home – Konqueror <2>
Adresse Bearbeiten Ansicht Gehe zu Lesezeichen Werkzeuge Einstellungen Fenster Hilfe
URL file:/home/m68k-elf-tools-20030314.sh
Netzwerk
Persönliches Verzeichnis
Wurzelverzeichnis
bin
boot
cdrom
dev
etc
floppy
home
lib
lost+found
mnt
opt
proc
root
sbin
Name Größe Geändert Berechtigungen Besitzer Gruppe Verknüpft
/ .xvpics 4 096 12.12.2003 17:40 rwxr-xr-x root root
/ bspl1 4 096 04.09.2002 15:35 rwx------ root root
/ bspl2 4 096 04.09.2002 15:53 rwx------ root root
/ bspl3 4 096 05.09.2002 11:28 rwx------ root root
/ bspl4 4 096 05.09.2002 15:40 rwx------ root root
/ debug 4 096 17.12.2001 16:19 rwx------ root root
/ dnp 4 096 12.12.2003 17:41 rwxr-xr-x root root
/ dnp5280 4 096 12.12.2003 17:30 rwxr-xr-x root root
/ kdw 4 096 04.12.2003 19:34 rwx------ root root
/ mha 4 096 02.05.2002 15:28 rwxr-xr-x root root
/ pnp 4 096 26.09.2003 11:23 rwxr-xr-x root root
_1a.gif 34 016 12.12.2003 17:40 rw-r--r-- root root
_3.gif 18 783 12.12.2003 17:37 rw-r--r-- root root
test 11 12.12.2003 14:12 rw-r--r-- root root
test.txt 0 12.12.2003 14:13 rw-r--r-- root root
Ein Element – Eine Datei (18,3 MB insgesamt) – 0 Verzeichnisse

Figure 6-16: Copying m68k-elf-tool-20030314.sh to the local hard disk drive

Run the shell script file *m68k-elf-tool-20030314.sh* from a console window at your Linux-based PC. The shell script creates new directories at ***/usr/local*** and copies many files to the new directory of your PC hard disk drive.

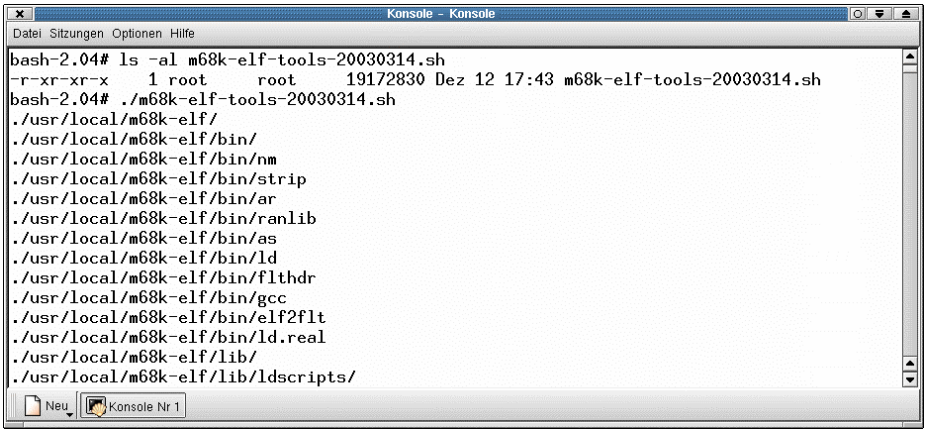


Figure 6-17: m68k-elf-tool-20030314.sh creates new directories at /usr/local

Now it is time for a test drive with the new GNU Cross Tool Chain. Open up a console window and create a new directory ***/home/dnp5282*** for DNP/5282 Linux C programming. Then change to this directory and enter the following command lines:

cat > hello.c
#include <stdio.h>
#include <stdlib.h>
void main (void)

{
printf ("Hello from DNP/5282!");
}

CONTROL + C stops the cat command and saves the input to the file *hello.c*.

These command lines create the new file *hello.c* and put some C source code lines to this new file. The command line:

cat hello.c

displays the current content of *hello.c*. For building an executable from *hello.c* please enter the following command line:

m68k-elf-gcc –Wall –m5307 –Wl,-elf2flt –Os –o hello hello.c –lc

This command line runs the GNU C cross compiler and linker. After a successful run you will find an executable for the DNP/5282 within the same directory.

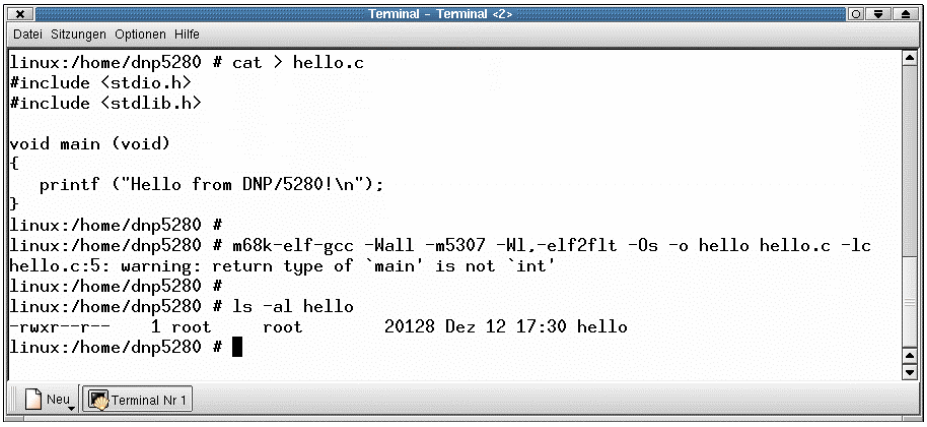


Figure 6-18: Working with the GNU Cross Tool Chain

Transfer the executable from your PC hard disk drive to the DNP/5282 RAM disk or JFFS-based flash disk drive and run the executable on your DNP/5282 inside of the IGW/800. Use a TFTP session and a Telnet session for this task. Please enter the following commands within the DNP/5282 Telnet session window:

tftp –g –l hello 192.168.0.1
chmod +x hello
./hello

The first command line transfers the executable *hello* from the PC to the DNP/5282 inside of the IGW/800. This line assumes that the PC is using the IP address 192.168.0.1.
The second line makes sure that the executable attribute is set for *hello*.
The next command line runs *hello*.

6.8 GNU Cross Debugger

The GNU Cross Tool Chain for DNP/5282 Linux C programming offers a pre-build cross version of the **GNU Debugger**, called *m68k-elf-gdb*.

This debugger runs on a Linux-based PC and allows you to debug DNP/5282 µCLinux executables with ELF layout at C source code level over a remote connection to the DNP/5282.

The cross debugger needs an Ethernet-based TCP/IP link between the PC and the DNP/5282 inside of the IGW/800. In addition the debugger needs also a remote debugging agent, called **gdbserver** for the DNP/5282. This agent is pre-installed within the DNP/5282 Linux.

Write your C program and translate the C source code with the GNU cross C compiler to an executable and a symbol file. Use the following command line with the ***–g*** parameter. This sample command line builds an executable, called *loop* from a source code file with the name *loop.c* and a file *loop.gdb* with symbol information:

m68k-elf-gcc –Wall –g –m5307 –Wl,-elf2flt –Os –o loop loop.c –lc

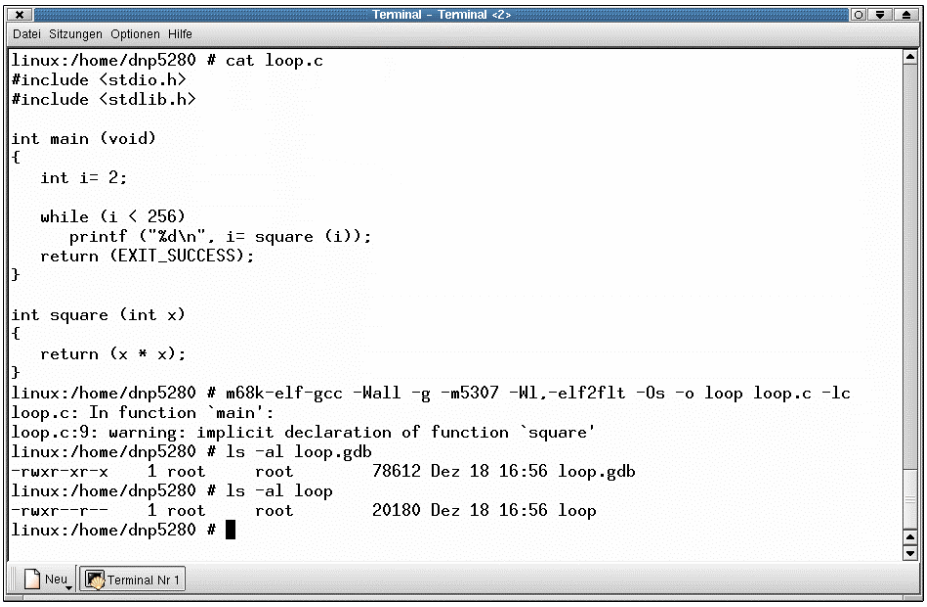


Figure 6-19: Compiling a C program with the GNU Cross Debugger

Transfer the executable from your PC hard disk drive to the DNP/5282 RAM disk or JFFS-based flash disk drive and run the executable on your DNP/5282 with the help of *gdbserver*. Use a TFTP session and a Telnet session for this task. Please enter the following command lines within the DNP/5282 Telnet session window:

tftp –g –l loop 192.168.0.1
chmod +x loop
gdbserver 192.168.0.1:2222 ./loop

The first command line transfers the executable *loop* from the PC to the DNP/5282 inside of the IGW/800. This line assumes that your PC is using the IP address 192.168.0.1.
The second line makes sure that the executable attribute is set for *hello*.
The third command line runs *loop* with the help of *gdbserver*. Within this command line you need the IP address of the PC together with a TCP/IP port number. We use the port number 2222 for this sample.

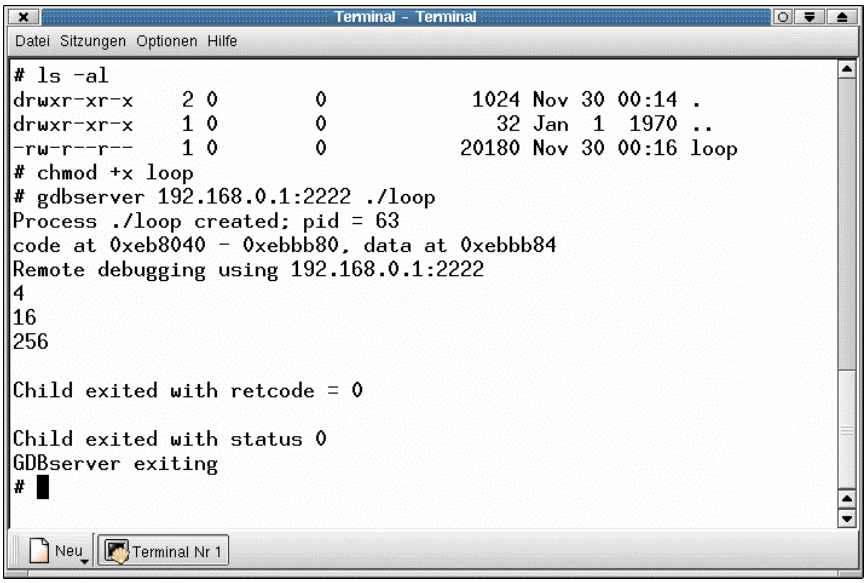

Terminal - Terminal
Datei Sitzungen Optionen Hilfe
ls -al
drwxr-xr-x 2 0 0 1024 Nov 30 00:14 .
drwxr-xr-x 1 0 0 32 Jan 1 1970 ..
-rw-r--r-- 1 0 0 20180 Nov 30 00:16 loop
chmod +x loop
gdbserver 192.168.0.1:2222 ./loop
Process ./loop created; pid = 63
code at 0xeb8040 - 0xebbb80, data at 0xebbb84
Remote debugging using 192.168.0.1:2222
4
16
256
Child exited with retcode = 0
Child exited with status 0
GDBserver exiting
#
Neu
Terminal Nr 1

Figure 6-20: File transfer and execution

Run the GNU Cross Debugger *m68k-elf-gdb* on your PC. Use the following command line. The parameter *loop.gdb* is the file name for the symbol information file.

m68k-elf-gdb loop.gdb

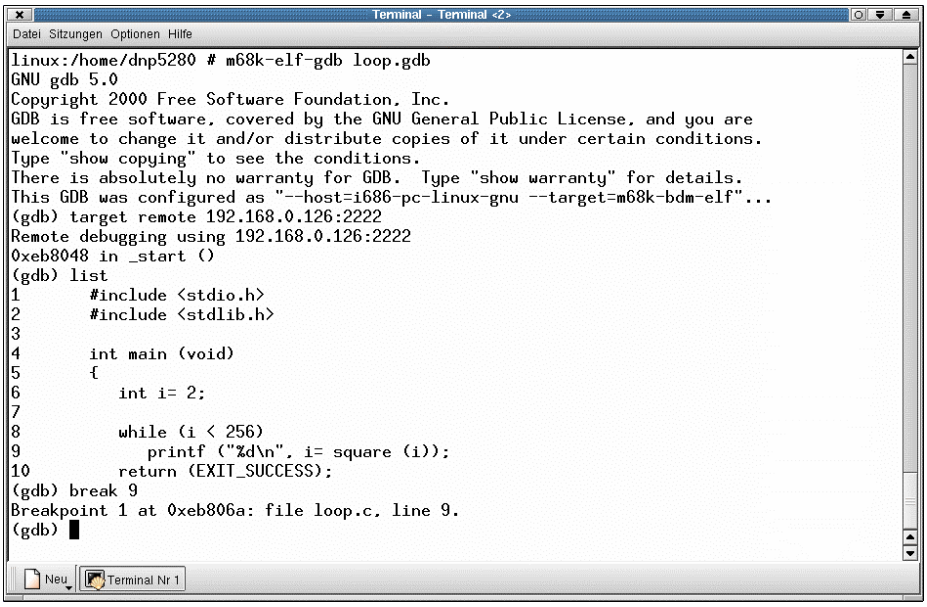

Terminal - Terminal <2>
Datei Sitzungen Optionen Hilfe
linux:/home/dnp5280 # m68k-elf-gdb loop.gdb
GNU gdb 5.0
Copyright 2000 Free Software Foundation, Inc.
GDB is free software, covered by the GNU General Public License, and you are
welcome to change it and/or distribute copies of it under certain conditions.
Type "show copying" to see the conditions.
There is absolutely no warranty for GDB. Type "show warranty" for details.
This GDB was configured as "--host=i686-pc-linux-gnu --target=m68k-bdm-elf"...
(gdb) target remote 192.168.0.126:2222
Remote debugging using 192.168.0.126:2222
0xeb8048 in _start ()
(gdb) list
1 #include <stdio.h>
2 #include <stdlib.h>
3
4 int main (void)
5 {
6 int i= 2;
7
8 while (i < 256)
9 printf ("%d\n", i= square (i));
10 return (EXIT_SUCCESS);
(gdb) break 9
Breakpoint 1 at 0xeb806a: file loop.c, line 9.
(gdb)
Neu
Terminal Nr 1

Figure 6-21: The GNU Cross Debugger at work

Now the debugger waits for your debugging commands. First please enter always the following command line:

target remote 192.168.0.126:2222

This debugger command line sets up the Ethernet-based TCP/IP connection between the PC and the DNP/5282 inside of the IGW/800. Please use the same TCP/IP port number (2222). The sample command line assumes that the DNP/5282 uses the IP address 192.168.0.126.

Then set your breakpoints within the C source code and run your program with the remote debugging session between the PC and the DNP/5282 inside of the IGW/800.

Use the debugger command ***continue*** for running the program. The program runs to the next breakpoint. The short form for this command is ***cont***.

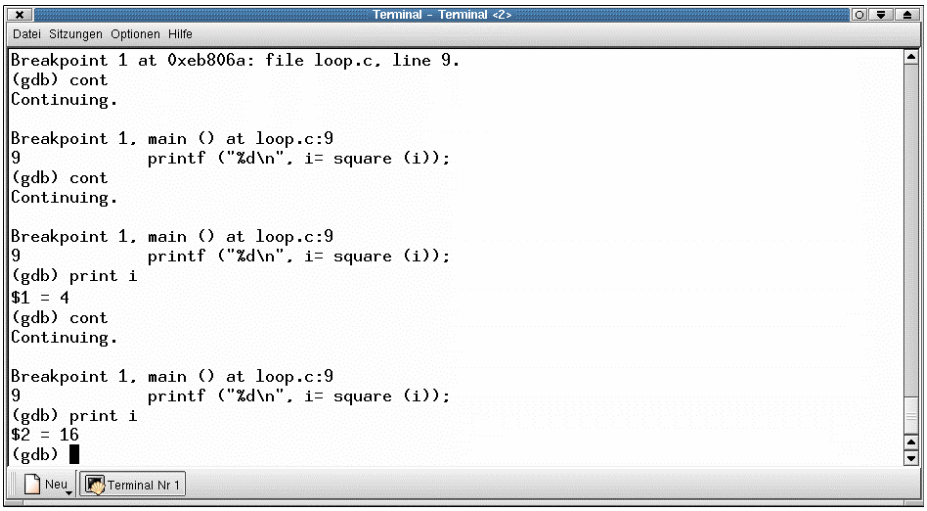


Figure 6-22: Setting breakpoints

6.9 GNU Cross Debugger with DDD (Data Display Debugger)

The GNU Cross Tool Chain for DNP/5282 Linux C programming offers a pre-build cross version of the GNU Debugger, called *m68k-elf-gdb*. This debugger runs on a Linux-based PC and allows you to debug DNP/5282 µCLinux executables with ELF layout at C source code level over a remote connection to the DNP/5282.

The cross debugger needs an Ethernet-based TCP/IP link between the PC and the DNP/5282 inside of the IGW/800. In addition the debugger needs also a remote debugging agent, called *gdbserver* for the DNP/5282. This agent is pre-installed within the DNP/5282 Linux.

The GNU debugger offers a simple command line interface and a lot of different commands. With the help of **DDD (Data Display Debugger** - a graphical front-end for command line debuggers) you get a powerful graphical user interface for the GNU debugger. DDD is a part of many PC Linux distributions.

DDD is also available from *http://www.gnu.org/software/ddd/*.

Write your C program and translate the C source code with the GNU cross C compiler to an executable and a symbol file. Use the following command line with the ***–g*** parameter. This sample command line builds an executable, called *loop* from a source code file with the name *loop.c* and a file *loop.gdb* with symbol information.

m68k-elf-gcc –Wall –g –m5307 –Wl,-elf2flt –Os –o loop loop.c –lc

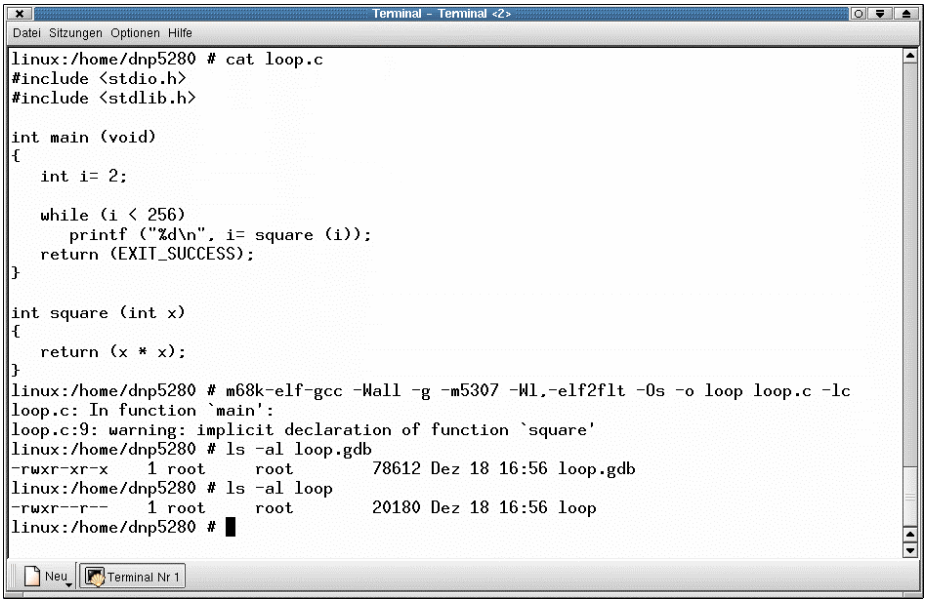


Figure 6-23: Compiling a C program

Then transfer the executable from your PC hard disk drive to the DNP/5282 RAM disk or JFFS-based flash disk drive and run the executable on your DNP/5282 with the help of *gdbserver*. Use a TFTP session and a Telnet session for this task. Please enter the commands on the next page within the DNP/5282 Telnet session window:

tftp –g –l loop 192.168.0.1
chmod +x loop
gdbserver 192.168.0.1:2222 ./loop

The first command line transfers the executable *loop* from the PC to the DNP/5282 inside of the IGW/800. This line assumes that your PC uses the IP address 192.168.0.1. The second line makes sure that the executable attribute is set for *hello*. The third command line runs *loop* with the help of *gdbserver*. Within this command line you need the IP address of the PC together with a TCP/IP port number. We use the port number 2222 for this sample.

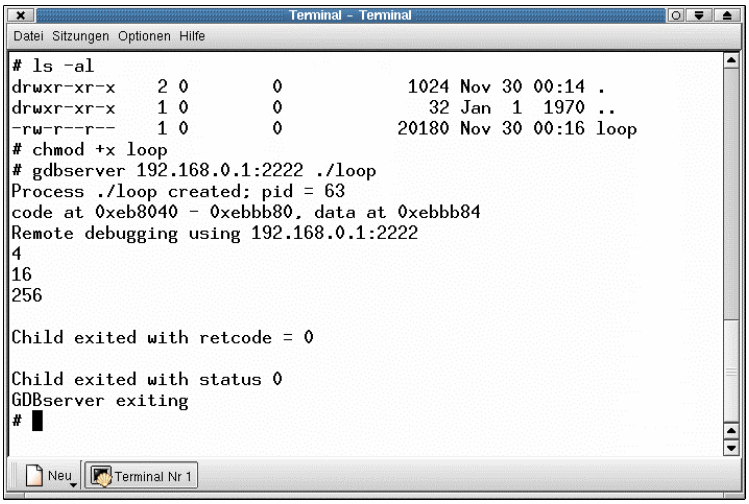

Terminal - Terminal
Datei Sitzungen Optionen Hilfe
ls -al
drwxr-xr-x 2 0 0 1024 Nov 30 00:14 .
drwxr-xr-x 1 0 0 32 Jan 1 1970 ..
-rw-r--r-- 1 0 0 20180 Nov 30 00:16 loop
chmod +x loop
gdbserver 192.168.0.1:2222 ./loop
Process ./loop created; pid = 63
code at 0xeb8040 - 0xebbb80, data at 0xebbb84
Remote debugging using 192.168.0.1:2222
4
16
256
Child exited with retcode = 0
Child exited with status 0
GDBserver exiting
#
Neu
Terminal Nr 1

Figure 6-24: File transfer and execution

Run the GNU Cross Debugger *m68k-elf-gdb* with the help of DDD on your PC. Use the following command line. The parameter ***--debugger m68k-elf-gdb*** tells DDD the name of the debugger, *loop.gdb* is the file name for the symbol information file.

ddd –-debugger m68k-elf-gdb loop.gdb

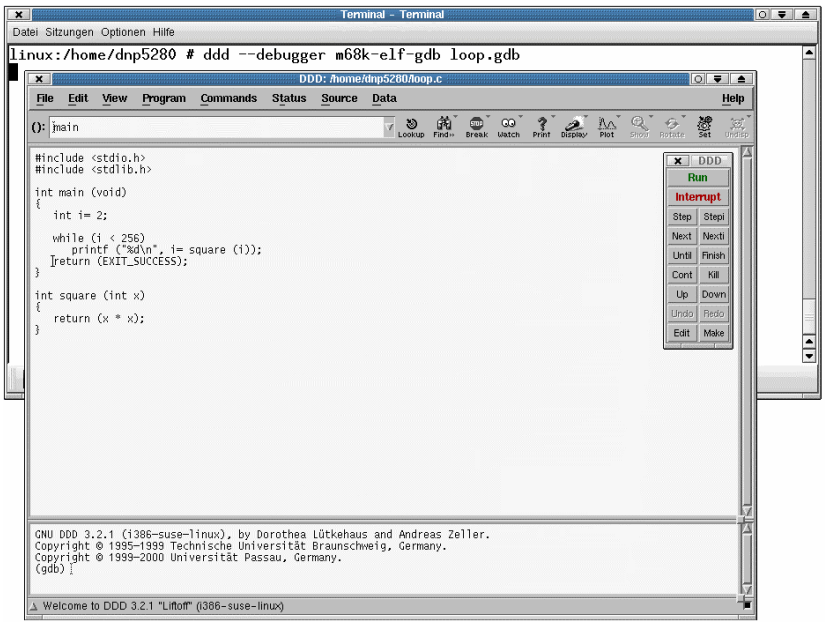


Figure 6-25: Working with the DDD

Now the debugger waits for your debugging commands. First please enter always the following command line within the DDD command line window:

target remote 192.168.0.126:2222

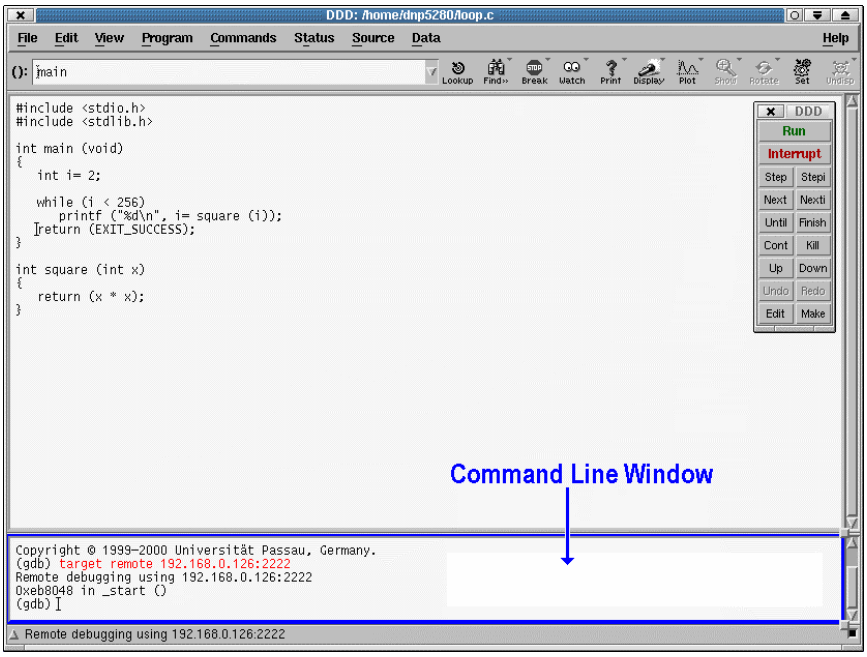

DDD: /home/dnp5280/loop.c
File Edit View Program Commands Status Source Data Help
Command Line Window
Copyright © 1999-2000 Universität Passau, Germany.
(gdb) target remote 192.168.0.126:2222
Remote debugging using 192.168.0.126:2222
0xeb8048 in _start ()
(gdb)
Remote debugging using 192.168.0.126:2222

Figure 6-26: Typing commands in the command line window

This debugger command line sets up the Ethernet-based TCP/IP connection between the PC and the DNP/5282 inside of the IGW/800. Please use the same TCP/IP port number (2222). The sample command line assumes that the DNP/5282 uses the IP address 192.168.0.126.

Then set your breakpoints within the C source code and run your program with your remote debugging session between the PC and the DNP/5282.

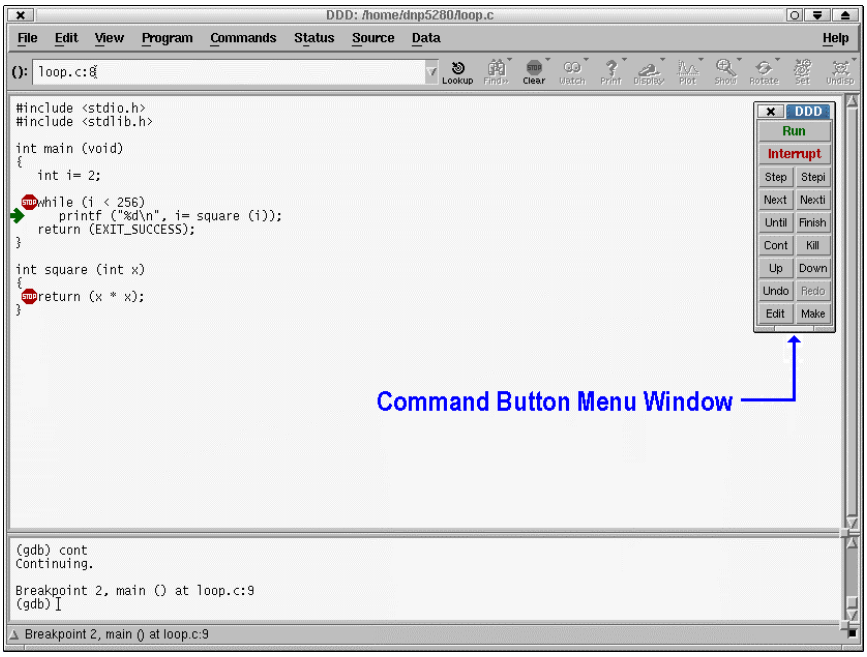


Figure 6-27: Using the command button menu window

DDD allows you to set breakpoints with your mouse. Just put the mouse cursor over the source code line of your choice and press the right hand mouse button. Then use the command button for

continue

from the command button menu window for running the program. The program runs to the next (or first) breakpoint. You can also use the command button

step

for single-stepping at C language level through your program. If the program execution stops, you can enter debugger commands within the DDD command line window. For example

show version

The GNU Debugger shows then some copyright and version information and the current configuration (Build for Host *i686-pc-linux-gnu*. Build for Target *m68k-bdm-elf*).

APPENDIX 1: BLOCK DIAGRAM

The next figure shows the schematic diagram of the IGW/800. The basis forms a DIL/NetPC DNP/5282 with Motorola Coldfire MCU MCF5282 and a clock rate of 66 MHz. The IGW/800 needs a 12-24 VDC supply. To provide the DNP/5282 inside the IGW/800 with the necessary voltage of 3.3V there is an internal transformator inside of the IGW/800. The connection of the serial interfaces COM1 (RS232) and COM2 (RS485) to the DNP/5282 are made via internal level shifters. For the connection with Ethernet networks there is a 10/100 Mbps interface present, which automatically detect the correct data rate. To check the current system status the IGW/800 is equipped with four LED indicators that signal the providing with power as well as the actual status of the three free programmable ports.

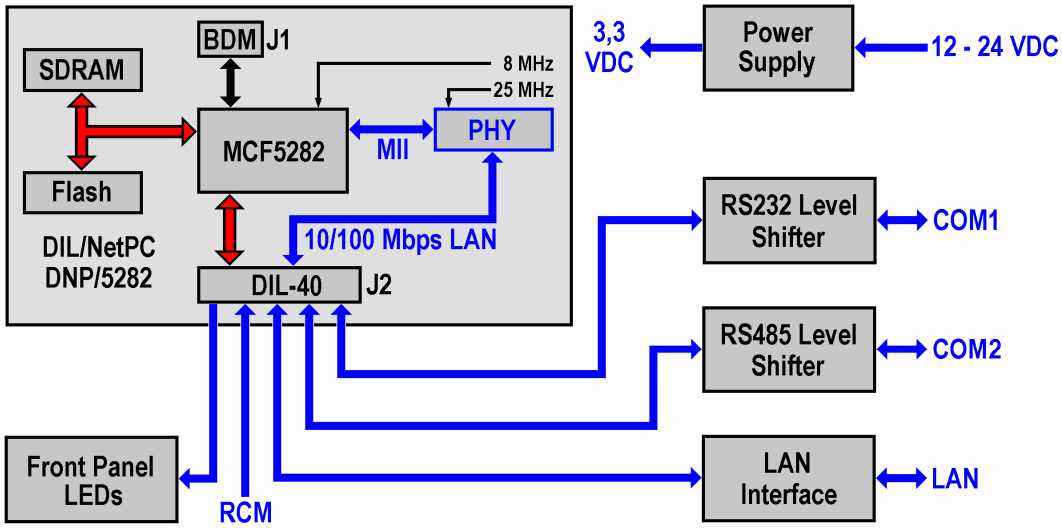


Figure A1-1: Block diagram of the IGW/800

APPENDIX 2: MECHANICAL DIMENSIONS

The IGW/800 a size of 97 x 22.5 x 90 mm (L x W x H). These dimensions are shown in the figure below. On the backside of the IGW/800 there is a 35 mm DIN rail mounting unit.

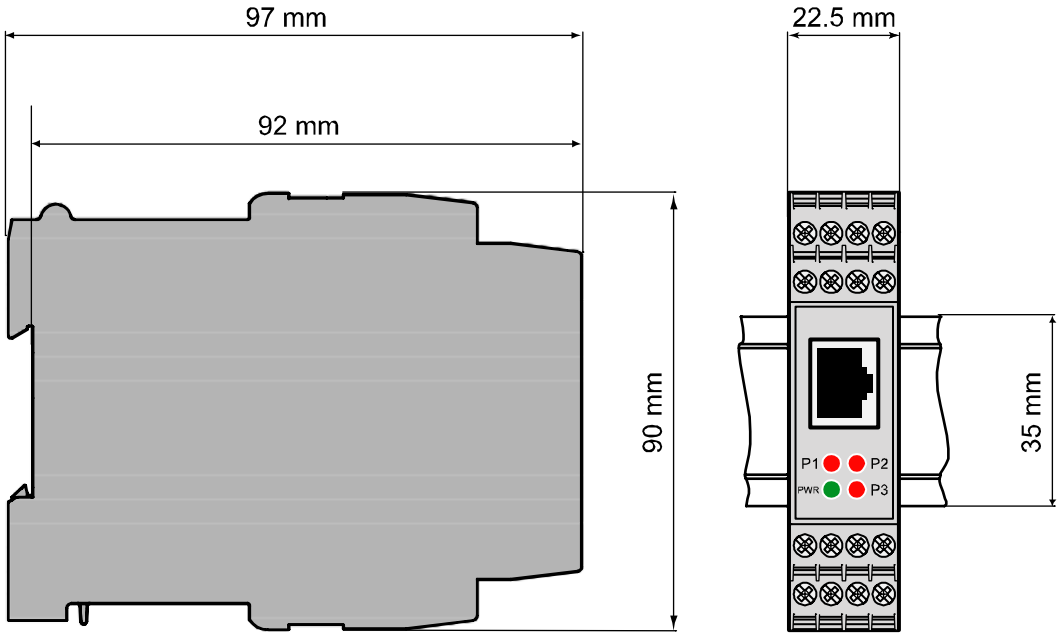
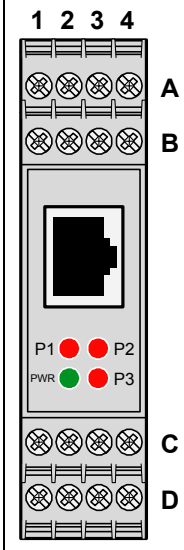


Figure A2-1: Mechanical dimensions of the IGW/800

APPENDIX 3: PINOUT IGW/800

The table A3-1 shows the assignment of the IGW/800 screw terminal.



	COM1	COM2	Power	RCM
	RS232	RS485		
A1			V+ IN	
A2			GND IN	
A3				
A4				
B1	RTS			
B2	TXD			
B3	RXD			
B4	CTS			
C1	Sig. GND	Sig. GND		RCM
C2				
C3				
C4				RCM
D1		RX/TX+		
D2				
D3		RX/TX-		
D4				

= Cable bridge

Table A3-1: Pinout of the IGW/800

APPENDIX 4: GNU GENERAL PUBLIC LICENSE

GNU GENERAL PUBLIC LICENSE. Version 2, June 1991. Copyright © 1989, 1991 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA. Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.
Preamble
The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation's software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License in-stead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain respon-sibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author's protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors' reputations. Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone's free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

GNU GENERAL PUBLIC LICENSE. TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

1. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The "Program", below, refers to any such program or work, and a "work based on the Program" means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term "modification".) Each license is addressed as "you".

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program's source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

1. You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.

b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.

c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

1. Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for non-commercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein.

You are not responsible for enforcing compliance by third parties to this License.

1. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.
It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

1. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

1. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and "any later version", you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.
10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the au-

thor to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the "copyright" line and a pointer to where the full notice is found.

<one line to give the program's name and a brief idea of what it does.>
Copyright © <year> <name of author>

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software foundation; either version 2 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

Gnomovision version 69, Copyright © year name of author Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'. This is free software, and you are welcome to redistribute it under certain conditions; type `show c' for details.

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items—whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a "copyright disclaimer" for the program, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the program `Gnomovision' (which makes passes at compilers) written by James Hacker.

<signature of Ty Coon>, 1 April 1989
Ty Coon, President of Vice

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.

APPENDIX 5: GNU LESSER GENERAL PUBLIC LICENSE

GNU LESSER GENERAL PUBLIC LICENSE. Version 2.1, February 1999. Copyright © 1991, 1999 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA. Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed. [This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages—typically libraries—of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights. We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.
When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom.

The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the "Lesser" General Public License because it does Less to protect the user's freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users' freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a "work based on the library" and a "work that uses the library". The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

GNU LESSER GENERAL PUBLIC LICENSE. TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called "this License"). Each licensee is addressed as "you".

A “library” means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The “Library”, below, refers to any such software library or work which has been distributed under these terms. A “work based on the Library” means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term “modification”.)

“Source code” for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.
Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

You may copy and distribute verbatim copies of the Library’s complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

The modified work must itself be a software library.

b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.

c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.

d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful. (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of
this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.
5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a “work that uses the Library”. Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a “work that uses the Library” with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a “work that uses the library”. The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a “work that uses the Library” uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a “work that uses the Library” with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer’s own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable “work that uses the Library”, as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user’s computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.

c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.

d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.

e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the “work that uses the Library” must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.

b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.
You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients’ exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties with this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then

the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and “any later version”, you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License). To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the “copyright” line and a pointer to where the full notice is found.
<one line to give the library’s name and a brief idea of what it does.>
Copyright © <year> <name of author>
This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA
Also add information on how to contact you by electronic and paper mail. You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob’ (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

LIST OF FIGURES

Figure 2-1: IGW/800 overview 6
Figure 4-1: Mounting the IGW/800 on a DIN-rail 8
Figure 4-2: Connecting the IGW/800 with the power supply for software development 9
Figure 4-3: Providing the IGW/800 with power in an industrial environment on a DIN-rail 9
Figure 4-4: Ethernet link with hub/switch 10
Figure 4-5: Ethernet link with crossover cable 10
Figure 4-6: RS232 serial link 10
Figure 4-9: RS485Figure 4-7: RS485 serial link 10
Figure 4-8: Connection of the termination resistor for a RS485 serial link 10
Figure 4-9: Connection of the termination resistor for a RS485 serial link 10
Figure 4-10: Activation of RCM on the IGW/800 10
Figure 5-1: Interface dialog box 10
Figure 5-2: Communication parameter settings 10
Figure 5-3: Linux boot process 10
Figure 5-4: Linux command prompt 10
Figure 5-5: Network interface addresses 10
Figure 5-6: Windows IP address settings 10
Figure 5-7: Communication check via PING 10
Figure 5-8: Communication check via ipconfig command 10
Figure 5-9: Web page shown by the MS-Internet Explorer 10
Figure 5-10: Boot process with RCM jumper set 10
Figure 5-11: Assigning a new IP-address to the DNP/5282 10
Figure 5-12: Command set with parameters 10
Figure 5-13: DNP/5282 Linux boot process 10
Figure 5-14: Running the MS-Windows Telnet client 10
Figure 5-15: Enter Linux commands via Telnet 10
Figure 5-16: Running TFTPD32 10
Figure 5-17: Changing the default directory for TFTPD32 10
Figure 5-18: Using the DNP/5282 TFTP client within a Telnet session 10
Figure 6-1: Serial port settings under Minicom 10
Figure 6-2: Linux boot process 10
Figure 6-3: Linux command prompt 10
Figure 6-4: Ping request 10
Figure 6-5: IP-address check via ifconfig 10
Figure 6-6: Web page shown by the Konqueror File Manager 10
Figure 6-7: Boot process with RCM enabled 10
Figure 6-8: Assigning a new IP-address to the IGW/800 10
Figure 6-9: Command set with parameters 10
Figure 6-10: Linux boot process 10
Figure 6-11: Linux login 10
Figure 6-12: Enter Linux commands via Telnet 10
Figure 6-13: Running TFTPD32 10
Figure 6-14: Using the DNP/5282 TFTP client within a Telnet session 10
Figure 6-15: Location of m68k-elf-tool-20030314.sh at the DNP/SK14 CD-ROM 10
Figure 6-16: Copying m68k-elf-tool-20030314.sh to the local hard disk drive 10
Figure 6-17: m68k-elf-tool-20030314.sh creates new directories at /usr/local 10
Figure 6-18: Working with the GNU Cross Tool Chain 10
Figure 6-19: Compiling a C program with the GNU Cross Debugger 10
Figure 6-20: File transfer and execution 10
Figure 6-21: The GNU Cross Debugger at work 10
Figure 6-22: Setting breakpoints 10
Figure 6-23: Compiling a C program 10

Figure 6-24: File transfer and execution 10
Figure 6-25: Working with the DDD 10
Figure 6-26: Typing commands in the command line window 10
Figure 6-27: Using the command button menu window 10
Figure A1-1: Block diagram of the IGW/800 10
Figure A2-1: Mechanical dimensions of the IGW/800 10

LIST OF TABLES

Table 1-1: Convention usage 4
Table 3-1: Assignment of the general purpose LEDs 7
Table A3-1: Pinout of the IGW/800 10

LIST OF APPENDIXES

Appendix 1: Block Diagram 10
Appendix 2: Mechanical Dimensions 10
Appendix 3: Pinout IGW/800 10
Appendix 4: GNU General Public License 10
Appendix 5: GNU Lesser General Public License 10
List of Figures 10
List of Tables 10
Helpful Literature 10
Contact 10
Document History 10

HELPFUL LITERATURE

DIL/NetPC DNP5282 Starter Kit User Manual

ColdFire Programmers Reference Manual R.1.0 (MCF5200PRM/AD)

MCF5282 ColdFire Microcontroller User's Manual R.0.1 (MCF5282UM/D)

CONTACT

SSV Embedded Systems
Heisterbergallee 72
D-30453 Hannover
Phone +49-(0)511-40000-0
Fax +49-(0)511-40000-40
e-mail: sales@ist1.de
Internet: www.ssv-comm.de

DOCUMENT HISTORY

Revision	Date	Remarks	Name
1.0	2004-05-26	first version	WBU/JNE
1.1	2004-05-27	some figure corrections	JNE
1.2	2004-06-08	figures improved	WBU
1.3	2005-05-23	references to chapter 4.7 rectified	JNE

This document is written only for the internal application. The content of this document can change any time without announcement. There is taken over no guarantee for the accuracy of the statements.

Copyright © **SSV EMBEDDED SYSTEMS 2004**. All rights reserved.

INFORMATION PROVIDED IN THIS DOCUMENT IS PROVIDED 'AS IS' WITHOUT WARRANTY OF ANY KIND. The user assumes the entire risk as to the accuracy and the use of this document. Some names within this document can be trademarks of their respective holders.